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# The Great Scope for Development.

IN the closing portions of his presidential address to the Institution of Electrical Engineers, Lieut.-Col. K. Edgcumbe mentioned several points which require repetition from time to time for the purpose of encouraging ever-increasing effort upon the part of all who are, or ought to be, interested in the commercial development of electricity supply.

We refer especially to the great scope for growth of the domestic load. The Wiring of British Homes Campaign organised by the B.E.D.A. two years ago laid stress upon the large percentage of households in which electricity then had no place at all even for lighting, let alone for other uses. Col. Edgcumbe points out, and the official figures of the Electricity Commissioners support the statement, that the amount used for domestic purposes is increasing more rapidly than that used for power. Further, as he says, this load is much less affected by periods of bad trade than is the power load. It is the custom when erecting new houses to install electric wiring when the supply is within comparatively easy call, and sometimes when it is not, but while the additions of new property in a supply area form a very acceptable class of business, it is in the addition of new points both for lighting and for cooking, heating and manifold other purposes, that there is the largest room for expansion. The brilliant prospect before this section of electricity supply business alone is sufficient to amply justify optimism both as to the present and the future. Properly regarded in relation to the whole industry, it will act as a corrective or antidote to depressing propaganda.

The president's closing words should be taken to heart by every electricity supply man and every electrical contractor and trader. His conclusions are based upon the assumption that effective steps will be taken to popularise and extend the use of electricity. There must be no relaxation of effort in this direction. However excellent may be our specialised campaigns—such as that now in progress for securing better lighting in factories and workshops—we must not at any time neglect domestic possibilities, for they offer an immensity of opportunity and scope. The programme of activities drawn up by E.D.A. for the period November, 1928, to June 1929, which will be circulated this week,

will, we trust, receive the hearty co-operation of everybody concerned. We refer to it fully elsewhere in this issue. Here also we must not omit to mention the "outlets campaign" which is being vigorously carried on throughout the whole country by the Electrical Association for Women.

The electricity supply side of the industry has too often waited for custom to come to it, instead of going out enterprisingly seeking for business. As Col. Edgcumbe says, "the industry has a commodity to sell and nothing sells itself." Other branches of industry have found highly organised sales departments essential, but the fact that householders come of their own accord clamouring for electricity supply may be responsible in some places for failure to establish efficient commercial departments for the purpose of accelerating domestic progress. There is undoubted improvement taking place in this connection, as our weekly record of new showrooms and exhibitions indicates, but if the whole industry from one end of the United Kingdom to the other would take "effective steps" for popularisation and for setting up efficiently staffed and well-financed sales departments, there would be more rapid progress in all sections of the industry. A quicker development of the domestic load would afford some compensation for a temporary lag in the industrial load development curve.

We have before us a document asking in its title whether our methods of measuring trade activity and business cycles are obsolete. We may be pardoned if we wonder whether we have not developed a little too zealously the habit of introspection—reporting upon things more frequently than is necessary or safe if we want to form sound judgment of what is occurring.

Short-time estimates indicating a temporary lag in industrial power consumption are not necessarily reliable as a guide to the state of things responsible therefor, or to what is likely to follow, and it is at least open to argument whether the industrial load will indefinitely continue to be more important than the domestic load to the electrical industry as a whole. The inevitable increase of population and of house property, the displacement of small city and town properties by big blocks of buildings consuming electricity on a liberal scale, and the extended uses of electricity in millions of houses which are either totally unprovided with it or use it on a very small scale, are broad indications of ground for hope for coming days.

On the general position of the scope for development, electricity suppliers and manufacturers alike can find ample additional justification for optimism both in agricultural developments and in railway electrification possibilities. Mr. S. E. Britton, in his inaugural address, recently bore witness to the welcome accorded by Cheshire farmers to electricity supply, and Mr. W. J. Bache, whose address is abstracted elsewhere in this issue, indicates that the potential consumption of British farms is of the order of 180 million kWh per annum, without counting the enormous load that electric ploughing may eventually provide. We may not see to-day an immediate glut of railway electrification work, but a reminder of the possible vast load from this branch of activity when it does arrive is found in the report that the Pennsylvania Railway Company has decided to spend £20,000,000 upon the electrification of its entire train service between New York and Wilmington, Delaware, electric power being derived from the Public Service Corporation of New Jersey and the Philadelphia Electric Company.

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**The Christmas Retail Trade.**

We write these lines while a November fog is hanging over London—what more appropriate reminder could we have of the nearness of the Christmas season? For some time past manufacturers and traders have been looking ahead and preparing their various classes of electrical products which are suitable for presentation at Christmas or the New Year, and it will be timely if we urge electrical contractors, showroom salesmen, and electrical retailers generally, to arrange for the early stocking and the effective display and advertising of such lines. Preparations for Christmas frequently bring new electrical alterations work for the contractor in preparation for more attractive window display, at about this time, and very soon the stocks must be laid in to the full limit of store accommodation. We need not detail here all the various articles ranging from a pocket lamp to an electric car that are so appropriate to different ages, tastes and stations of human life—manufacturers and traders set many of these forth in our advertising pages; moreover, our recent "Domestic Electrification Issue" contained particulars of a host of products which fit the Christmas requirements so well that editorial repetition is rendered unnecessary. The Electrical Development Association will be issuing in bulk in the course of a few weeks six publications for widespread distribution as "powder and shot," on "Practical Presents for Christmas"; "Electric Helps,"; "Christmas Presents"; "To Help You Choose Your Christmas Presents"; "A Present Problem Solved"; and "Xmas Cracker." Early application should be made to E.D.A. for consignments of these pamphlets. The November "Electric Heating" activity of E.D.A. will be followed in December with specialised national advertising boosting "Electric Xmas Presents," and secondary advertising respecting late shop lighting, and emphasising a "National Electric Week." The Association will also be issuing special Xmas posters and window displays, and advising everybody to "give something electrical." The retailer of experience knows that the Xmas selling season does not last long, but while it does last it will only be really successful if adequate preparations are made by varied selection, attractive display, clear-pricing, a live advertising policy appropriate to the locality, and energetic but good-humoured selling.

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**Trade and Advertising.**

We suppose that for most of the readers of these notes the subject of the relations between sales and advertising departments in industrial and engineering companies is hardly one of absorbing interest. Yet at a time when it is being more than ever brought home to us that only by adding to efficient industrial production effective commercial organisation can we hope to increase our trade and enable the race to earn its bread and butter, many otherwise remote matters become important. However excellent may be the article for sale, it will not make a market for itself. And however well drawn up the advertisement, it will fail to achieve the trader's purpose unless it appears in the right places, just as the effort of the best of salesmen is wasted unless he comes into touch with the right people. The sales and advertising staffs of a manufacturing company are both primarily intended to secure orders, and if they closely co-operate in making plans to that end their company may expect to keep busy. This co-operation involves many things which cannot be even mentioned in this brief note. There is what we know as publicity effort which is not advertising, yet is useful in assisting the selling staff if it is properly done. Neither the sales staff nor the advertising staff seems, generally speaking, to be able to collect material of the right kind and serve it up in suitable form; the publicity man or department comes along to perform this service, but unfortunately, as was stated by one of the speakers in the discussion at the first monthly luncheon of the Engineering Section of the Inc. Soc. of British Advertisers, publicity men are not always competent to deal with technical matters. Indeed, in our experience there is room for far more serious co-operation between production, publicity, advertising and selling staffs. At the luncheon referred to, other interesting points received attention. For example, it is important that advertisements in technical journals should reach actual buyers or those who can influence purchases. On this point it was stated that the Section was seeking means for inducing the publishers of trade papers to give

advertisers particulars of their circulations. Naturally enough, such information is needed by both sales and advertising staffs if they are to conduct their activities through the most direct and most promising channels. As the electrical and allied trades know, the Electrical Review has kept no secret with regard to its circulation for seven years past. By its net sales certificates it has periodically published the number of copies sold and distributed, as duly and independently authenticated, while by various statements it has indicated that it reaches all parts of the world and buyers in a host of trades and industries which, while not electrical themselves, are substantial purchasers of electrical goods.

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**Central Station Staff Changes.**

One of the outstanding merits of the admirable decentralisation system of the Institution of Electrical Engineers is that at the opening of each session a stream of carefully-thought-out commentaries on the various aspects of electrical science and industry, emanating from the leaders for the time being of the Local Centres, is poured forth for the edification of the members of the Institution. Do we fully realise the value of this symposium? The opinions thus spontaneously expressed, and the advice which is often put forward, by the respective chairmen of the 12 Centres and Sub-Centres should prove a source of inspiration and information to the whole electrical industry.

This week we publish an abstract of the inaugural address of Mr. W. J. Bache, who deals hopefully with the future of electricity supply undertakings which have to take bulk supply, and sympathetically with the case of the staff displaced thereby. We have the word of the chairman of the Central Electricity Board, Sir Andrew Duncan, that every effort will be made to avoid hardship, and we know that the E.P.E.A. and other bodies have given serious consideration to the subject ever since the policy of the Government was revealed; just over a year ago (October 14th, 1927) we drew attention to the importance of preparing in advance for the changes that must come, but we pointed out that there was no emergency, as the operations of the Central Electricity Board will be spread over a period of 10 or 15 years. Even now, almost two years after the passage of the Act of 1926, not a single kilowatt-hour has been sold by the Board, and many months must pass before its work begins to take effect.

But it is true that, without waiting for the "grid" to take shape, in isolated cases bulk supply will be substituted for local generation; indeed, the number of generating stations has already been materially reduced. In such circumstances immediate action is necessary. A year ago we recommended "staff men who foresee changes in their immediate environment . . . to prepare themselves to cope with the new conditions." How that can be done is shown by Mr. Bache, who, with commendable humanity and comradeship, has offered facilities for his station staff to make themselves acquainted with the duties of the mains department and other branches of his undertaking—facilities which have been readily utilised. That is an admirable method of smoothing the way, and we commend it to the notice of other station managers. If the situation is met on both sides, as Mr. Bache suggests, in the spirit that has been shown at Cheltenham, not only will the real difficulties be eased, but the vague apprehension which is so detrimental to the happiness and efficiency of the staff will be allayed, and all will be able to look forward with hope and confidence to the bright and prosperous future which, we are convinced, awaits the electricity supply industry.

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**Patent Law Reform.**

From time to time the Government takes in hand the reform of the British patent law, and after due deliberation formulates amendments which are eventually embodied in Acts of Parliament; but never does it accomplish more than a fraction of what is required to establish the system on a sound and just basis. The importance of encouraging the inventor and protecting the manufacturer of his devices can hardly be exaggerated; only by continual progress in invention, whether it be the fruit of individual ingenuity or of collective research, can we maintain our position as an industrial nation in the front rank, and the patent system exercises a powerful influence for good or ill upon our success in coping with foreign competition.

Having this fact in view, the British Science Guild, some eighteen months ago, appointed a committee representative of a wide range of interests "to consider what changes could advantageously be made in the British Patent Law"; yesterday the Report of the Committee was released for publication, and it will be found worthy of very careful consideration, as embodying the unanimous opinion of a very able body of men.

In a later issue we shall give a *résumé* of the report; at the moment we can only indicate its principal conclusions, which are as follows:—The 50-year limit should be extended to all documentary anticipations, and prior publication by the inventor should not invalidate his patent; a patent of addition should not be deemed to have been anticipated by the parent specification; the Patent Office search should be extended; the presence of "subject matter" in inventions resulting from research work should be recognised; British "short-term" patents (seven years) should be introduced; the time-allowance for filing a complete after provisional specification should be increased to twelve months; the Comptroller should be empowered to try infringement actions, subject to appeal; and a restricted Empire Patent should be instituted.

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**The Electrification of Railways.**

On Tuesday last the Report of the Railway Electrification Committee, appointed by the Minister of Transport a year ago, was published (H.M. Stationery Office, price 6s. 6d.). It follows on the report of the Advisory Committee of 1921 (Elec. Rev., September 16th, 1921, p. 371), and states that by March next there will be in all 1,500 miles of single-track electric railway, almost wholly operated by direct current—which is recommended for all future electrification, at bus-bar voltages of 1,500 or 750 V. The desire of the Minister "that railway electrification schemes should not be unduly hampered or rendered economically impracticable by regulations of too stringent a character" is quoted, and will be cordially endorsed by all who have suffered and are suffering from over-regulation. For this reason, and on technical grounds, the Committee disapproves of limitation of the drop of potential in the rail return.

An abstract of the Report will appear in our next issue.

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**The B.T.-H. and Met.-Vick. Companies.**

As we understand that many rumours have been current with reference to the arrangements which have been made for the future operations of the Metropolitan-Vickers Electrical Co., the British Thomson-Houston Co., Ferguson Pailin, and the Edison Swan Co., we would direct our readers to the further particulars which appear in our "Business Notices" to-day, as we have it on the highest authority that the facts as stated there are substantially accurate. We may lay emphasis upon the important point that the identity of each of the four companies will remain as at present, and that every effort will be made to keep it so. Further, the present Metropolitan-Vickers companies will in future be known as Metro.-Vick. Electrical Products, Limited. The four companies named above as parties to the arrangement will be controlled by a holding company in which the International General Electric Co. will have a less than half interest, the remaining shares in the holding company being held, as stated elsewhere, by British investors.

# The Coventry Electricity Works.

**The new Longford power station of the Coventry Corporation, which houses two 20,000-kW turbo-alternators and eight 60,000-lb. boilers, is the first section of a station designed to have an ultimate capacity of 100,000 kW.**

On Wednesday last week the Mayor of Coventry, Alderman F. Lee, officially inaugurated the new Longford power station of the Coventry Corporation, which has been scheduled as a base-load station under the National Electricity Scheme. The station, fig. 1, is conveniently situated as regards coal, water and general supplies, the site being bordered on the east by the Oxford canal, on the west by the L.M. and S. Railway, and on the south by the main Coventry-Nuneaton road; a system of railway sidings serves the coal-storage dumps, engine-room basement and transformer bays. The contract for the entire station was awarded to the British Thomson-Houston Co., Ltd., and all the work has been carried out to the specification and under the supervision of Mr. Geo. Tough, O.B.E., M.I.E.E., city electrical engineer and manager. The present installation comprises the first section of a station designed to have an ultimate capacity of 100,000 kW.

The turbine room has provision for extensions in the northerly direction, and the boiler house is a complete installation designed to provide the steam requirements of the first turbine-room section. New boiler houses will be provided as the turbo-generator plant is extended. The buildings, which were erected by the Cleveland Bridge and Engineering Co., Ltd., are of steel-frame construction, with brick and artificial stone filling. A 75-ton electrically-driven Morris crane spans the turbine room. The overall dimensions of the engine room are 160 ft. long by 110 ft. wide by 60 ft. high, and of the boiler house 130 ft. long by 90 ft. wide by 60 ft. high. At the southern end of the engine room are situated offices for the executive staff and various auxiliary departments.

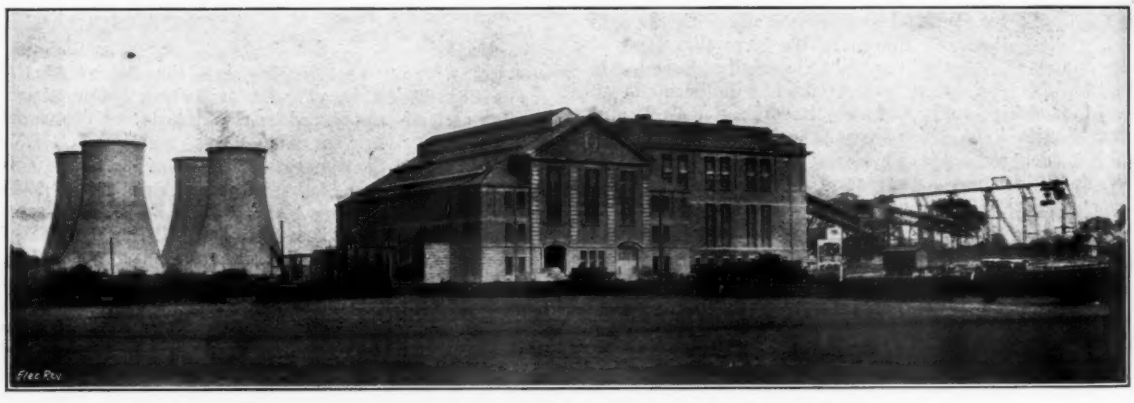

**Fig. 1.—Longford Power Station; Coal-handling Plant and Cooling Towers.**

Coal is brought to the station either by canal or rail. Canal-borne coal is unloaded from the barges by grabs operated by Strachan & Henshaw telpher machines running along an overhead track; the grabs discharge into an automatic weighing machine, which records the weight, not only of each load, but also the aggregate. Bennis U-link conveyors travelling along an inclined gantry take the coal to the bunkers or by means of shoots to a 3,500-ton emergency store; all the rail-borne coal is delivered to this store. An electrically-driven travelling jib crane is used to feed the coal from this dump to the main conveyors, and also for trimming purposes. The plant, fig. 2, will handle canal-borne coal at the rate of 50 tons per hour to the bunkers and 25 tons to the storage, simultaneously, or 50 tons per hour of rail-borne coal either to the bunkers or storage.

In the boiler house are eight 60,000-lb. boiler units, each boiler having a heating surface of 9,594 sq. ft., arranged in two rows of four units each, with a central firing aisle. Each boiler unit comprises a Stirling tri-drum boiler, superheater, superimposed Green tri-tube economiser, two Bennis chain-grate stokers, ten "Diamond" soot blowers, a "Sirocco" induced-draught fan, and a "Davidson" grit arrester. One 8.5-ft. diameter chimney serves each pair of boilers. Feed water enters the economiser at approximately 200 deg. F., and leaves at about 300 deg. F. The boiler steam conditions are 325 lb. per sq. in. and 700 deg. F. The grates embody a number of new features, including improved air-sealing arrangements.

A complete installation is provided for the removal and disposal of the ashes; these are discharged into a Bennis submerged conveyor, which quenches them and conveys them into storage bunkers outside the boiler house. They can then be discharged either into road vehicles or by means of a patent "Breco" mono-cable aerial ropeway to an ash dump on marshy land some distance away.

In the turbine room are two 20,000-kW B.T.-H. turbo-alternator sets, each of which consists of a two-cylinder double-flow turbine driving a main alternator, house-service alternator, main exciter and auxiliary exciter at 3,000 r.p.m. The turbine has a total of 21 stages. The high-pressure cylinder is of the impulse type, and nozzle control of steam admission by several valves to the high-pressure casing is employed. It is claimed that the system of governing applied to the turbines excels all previous B.T.-H. designs in its sensitiveness of control. Oscillograph tests have shown that it is possible to open and close twelve nozzle control valves in 1.34 sec.

The turbines normally give their maximum continuous rating with steam at 300 lb. per sq. in., 700 deg. F., when exhausting into a vacuum of 28 in., barometer 30 in. Should the initial steam conditions become bad or the vacuum fail, the turbines will still give the maximum continuous rating with h.p. steam by-passed to the lower stages in the h.p. casing. Fig. 3 is a view of one of the turbo-alternator sets, showing the tandem arrangements at the electrical end and the condensers. In the condenser basement are two welded steel steam

receivers, one of which is shown in fig. 4. One of these serves each turbine, but interconnecting piping provides for the two receivers to be used as a common supply or for either to work with any of the sets.

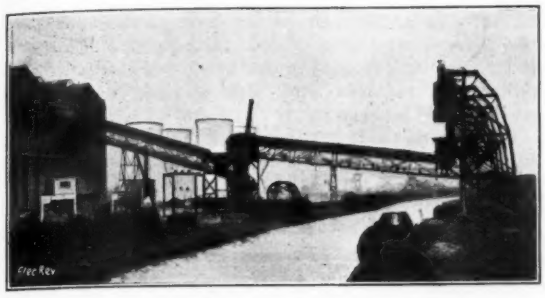

**Fig. 2.—Coal-handling Plant.**

up into the system. When the boiler feed pump demands a larger quantity of water than the condenser is passing, the level in the surge tank falls, and a float-operated valve opens, admitting make-up from the storage tank to the condenser. The make-up is introduced through a series of spray pipes housed in the upper part of the condenser. The water level in the storage tank falls in turn, causing a float-operated butterfly valve on the steam supply to the evaporator to open, and thus bringing the evaporator into commission. In the event of the tank level falling still lower, owing to the evaporator service not being available, or to any other cause, an emergency float valve opens and admits town water into the tank through an open tundish arranged in a conspicuous position. The evaporator continues to pass distilled water into the system until the level in the storage tank has built up sufficiently to close the steam supply valve and shut down the evaporator.

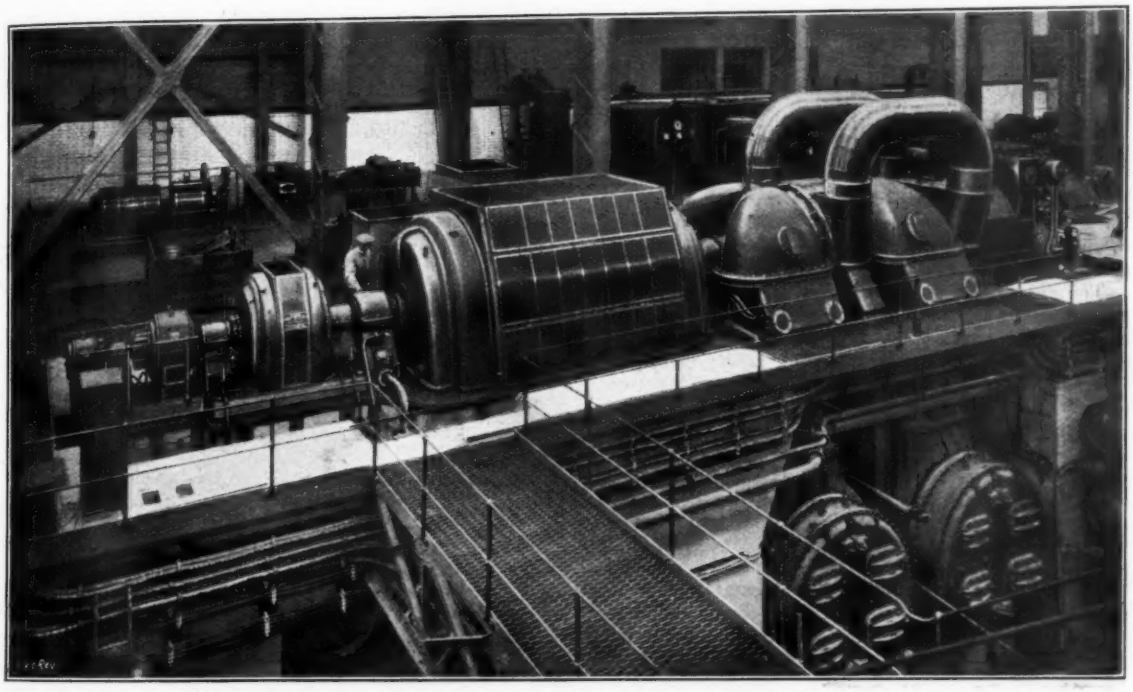

**Fig. 3.—20,000-kW Turbo-alternator Set, showing Auxiliary Machines and Condensers.**

Worthington-Simpson twin surface condensers are installed, having a cooling surface of 22,000 sq. ft. The auxiliaries include two 60 per cent. duty motor-driven circulating pumps, duplicate air ejectors of the steam-jet type, each capable of maintaining full-load conditions, and duplicate motor-driven 100 per cent. duty extraction pumps, fig. 4. A closed two-stage feed-heating system is designed to maintain a feed-water temperature of approximately 200 deg. F. at all loads. The first stage or l.p. heater, 750 sq. ft., is so arranged that it can deal with either bled steam from the main turbine, vapour from the evaporator, or a mixture of both. The second stage or h.p. heater, 330 sq. ft., utilises the exhaust steam from the Weir boiler pumps at a pressure of 3 lb. per sq. in. An evaporating plant (Worthington-Simpson) provided with each set is capable of distilling 7,500 lb. per hour of make-up water.

Surge and storage tanks are arranged on the turbine floor level, side by side with the evaporators, each having a capacity of 3,000 gallons. The surge tank is directly connected to both the extraction pump delivery and the boiler feed pump suction, so providing for periods when the demand by the latter does not coincide with the output of the former. An interesting feature is the automatic system of float controls which governs the working of the evaporator and the supply of make-

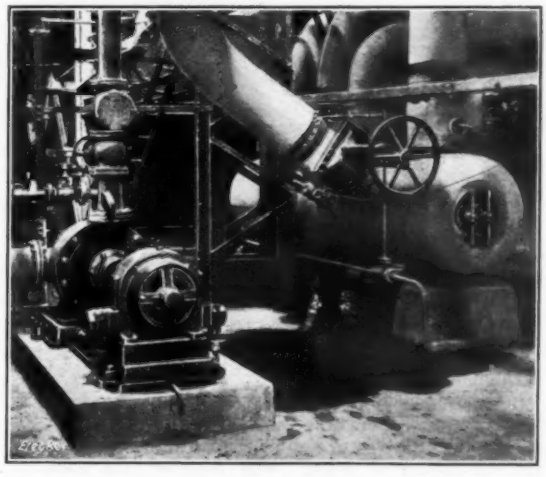

**Fig. 4.—Steam Receiver and Extraction Pumps.**

The circulating water from the condensers is taken to cooling towers in 33-in. diameter steel pipes laid in a covered concrete trench, and after cooling is returned to the reinforced concrete main suction culvert. The

circulating-water system has been laid out for the ultimate capacity of the station, provision having been made for connecting up future plant without affecting the running of the existing equipment. The necessary make-up is obtained from the canal. By means of a suitable outlet the system can be emptied into the canal, and during frosty weather warm water can be circulated in the canal to prevent its freezing. The four cooling towers at present installed, fig. 1, which were built by Messrs. Wilson Lovatt & Sons, Ltd., are of reinforced concrete construction and of hyperbolic shape

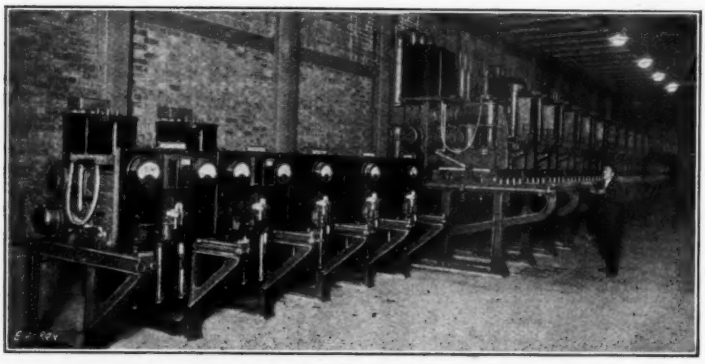

Fig. 5.—33,000-V and 6,600-V Metal-clad Switchgear.

to ensure stability and high cooling efficiency. They each have a normal capacity of 528,000 gal. per hour.

The main alternator of each set is connected solid to a main transformer bank which feeds various sub-stations at 33,000 V, at which pressure all the switching is carried out. It is wound for 6,600 V, three-phase, 50 cycles, and is rated to give 25,300 kVA at 74 per cent power factor, with a temperature rise not exceeding 80 deg. C. on the stator coils and 90 deg. C. on the rotor windings. Fans are attached to the ends of the rotor, the machine being self-ventilated on a closed system in which the circulating air is cooled in B.T.-H. air coolers. In order to simplify the design of the stator windings, phase leads are brought out at each end of the machine, half the load being carried by each set. It is of interest to note that the alternator stators are of "fabricated" construction, *i.e.*, they are built up in sections welded together. The auxiliary alternator is rated at 714 kVA, 70 per cent. power factor, 420 V, three-phase, 50 cycles, and is capable of supplying the boiler house and turbine auxiliaries. The main exciter is rated at 60 kW and excites the main alternator under all conditions of load. The field of the main exciter is energised by the auxiliary exciter, which has a rating of 13.5 kW. The auxiliary exciter is a shunt wound machine with a saturated magnetic circuit, so as to operate at constant voltage. The only rheostat in the main alternator field circuit is that controlled by a Tirrill voltage regulator for maintaining constant the main busbar voltage. By providing separate excitation for the main exciter, perfectly stable operation is ensured at all loads on the main alternator. The auxiliary exciter also feeds the house-service alternator field; a hand-operated rheostat is included in the circuit in this instance, as a close-voltage regulation is not necessary. The alternators are provided with the B.T.-H. system of circulating current protection, combined with field suppression switches, and stand-by definite time limit overload and leakage relays.

Beneath the switchgear control gallery, on the west of the engine room, is installed all the main switchgear, and on the outer side of the west wall are the two banks of three B.T.-H. single-phase step-up power transformers, fig. 6. These are of the "air jet" self-cooled outdoor type, and are claimed to be the largest of their kind so far installed in the country. They are connected in delta on the l.p. side and star on the h.p. side. The full-load output per bank is 23,475 kVA at 80 per cent. power factor. One oil conservator is provided for each bank, and a pressure relief pipe with a glass diaphragm is fitted to each transformer as a precaution against excess pressure developing in the tank. The transformers are equipped with valves for use in testing, treating, and conditioning the oil, and also with indicating and recording thermometers. The transformers are all interchangeable, and they may be moved about by means of a rail transfer truck which is included in the station equipment. There are also two self-cooled house-service transformers, fig. 6, located near the main transformers. These are three-phase units stepping down from 33,000 to 420 volts. Fig. 6 also shows the neutral earthing resistances (33,000 V).

The main 33,000-V switchgear, fig. 5, is of the metal-clad compound-filled type arranged for electrical operation. It is of duplicate-busbar construction, and is equipped with sectionalising breakers. Provision is made for installing busbar reactances when extensions are made to the equipment. The fixed part of each switch consists of a circuit connection chamber supported by the top busbar chamber, and the movable portion, which is mounted on rollers and racked into or out of the service position by a hand-operated screw mechanism, carries the oil-immersed circuit-breaker and the instrument and protective transformers. Voltage transformers are mounted in a readily accessible position on top of the fixed units, primary cut-outs being accommodated in the transformer tanks. Access to the transformers cannot be obtained until the connections have been withdrawn. An interlocking mechanism which is positively operated by the busbar-isolating plugs on the movable units enables indication to be given on the control board as to which set of busbars a

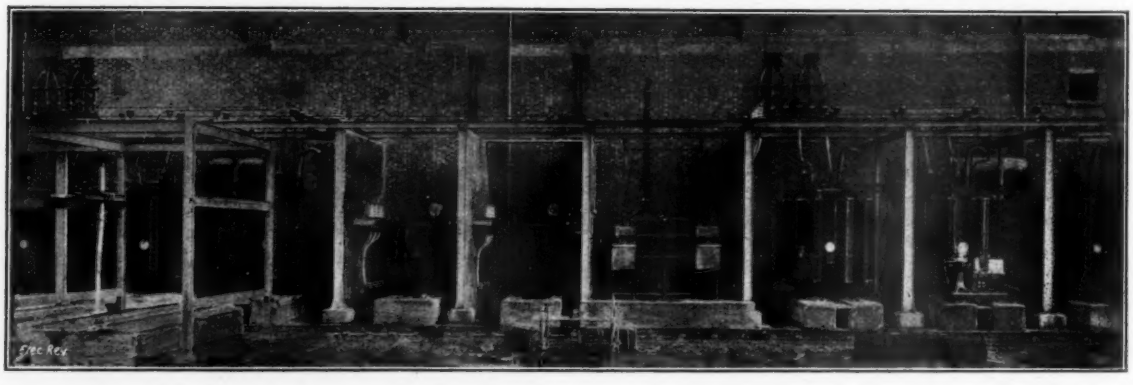

Fig. 6.—Main Step-up and House-service Transformers.

circuit breaker is connected to, auxiliary contacts for this purpose being fitted on the automatic busbar shutters. This interlocking mechanism is also arranged so that it is impossible to synchronise an equipment unless all three busbar isolating plugs are connected to the same set of busbars. The main circuit breakers are each designed for a rupturing capacity of 500,000 kVA.

The control board is of black-enamelled slate and has white-enamelled slate indicating panels mounted above, on which is outlined in black a single-line key diagram of the 33,000-V busbars and circuits. Automatically and electrically operated indicators show which circuit breakers are "open" and "closed."

Alongside the 33,000-V switchgear is a bank of 6,600-V compound-filled metal-clad switchgear, fig. 5, controlling the two 3,000-kVA, 33,000-V step-down transformers, and three outgoing feeders to the existing 6,600-V system. This switchgear is of single-busbar construction and the oil-immersed circuit breakers are directly hand controlled.

A 420-V, three-phase, 50-cycle, 25-panel, black-enamelled slate switchboard controls the station auxiliaries. It is situated on the same gallery as the main control board, and receives its supply from the house-service transformers and also from the house service alternators. All the switchgear is of B.T.-H. manufacture. The house-service alternators are connected to separate busbars for the boiler and turbine auxiliaries. For the latter supply the busbars are in two sections, so that each turbo-alternator set will supply its own auxiliaries. An emergency house-service alternator can be synchronised with the station transformers to facilitate starting up the station after both sets have been shut down. Above, and in line with the switchboard panels, are hinged expanded metal doors which give access to the pole-operated isolators.

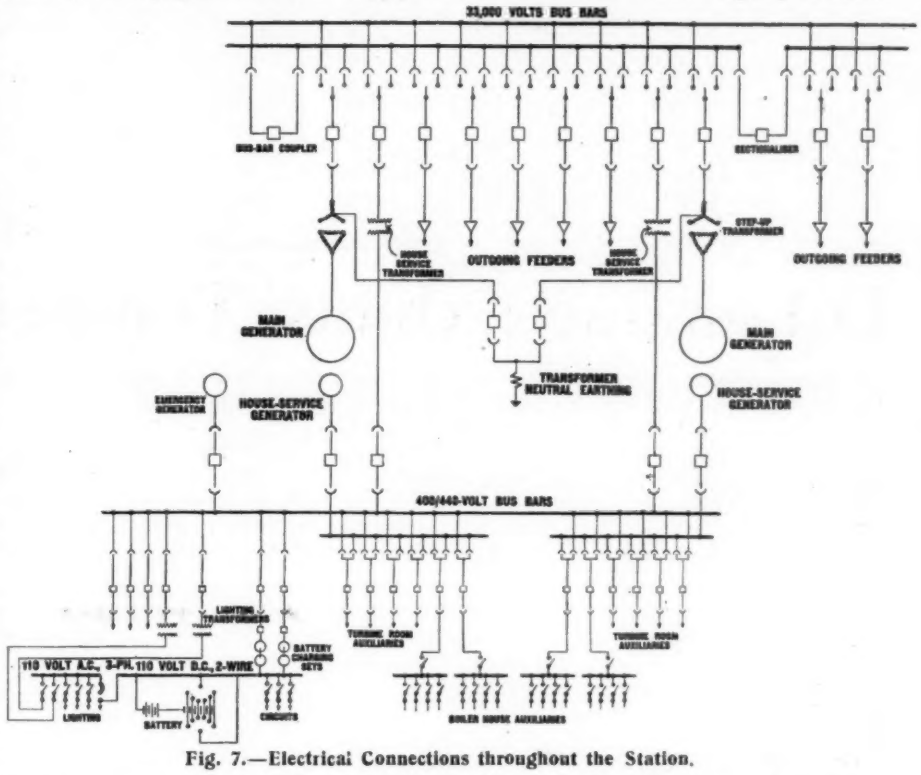


Fig. 7.—Electrical Connections throughout the Station.

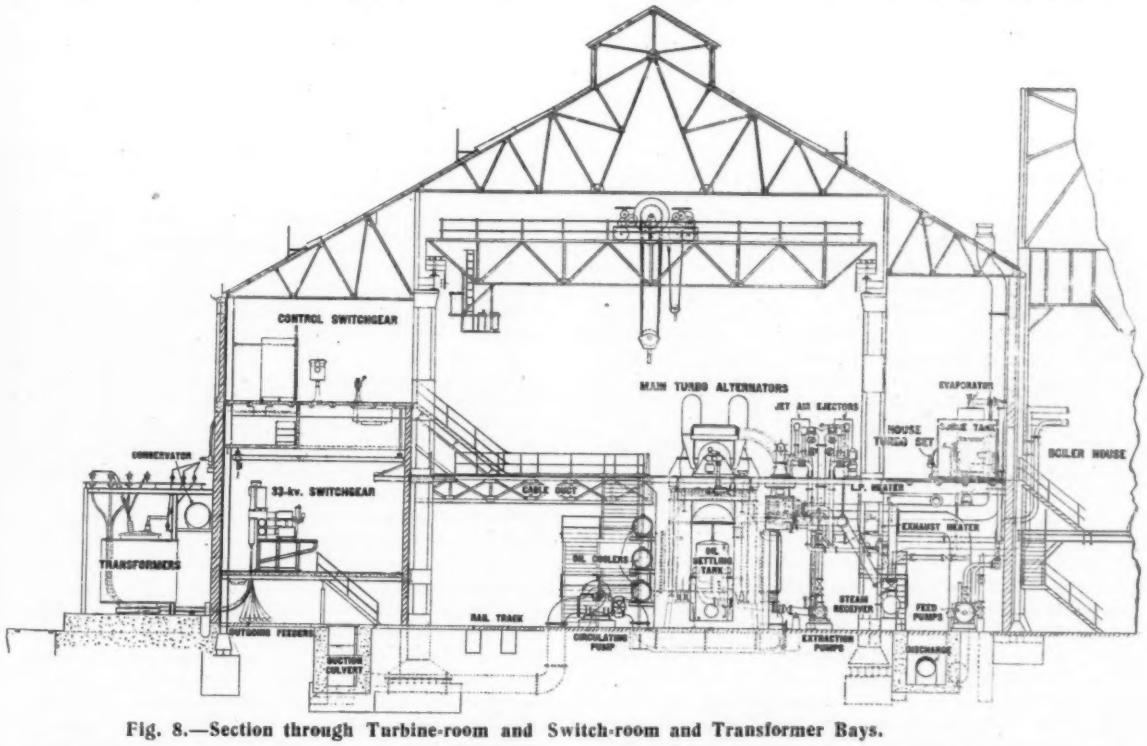


Fig. 8.—Section through Turbine-room and Switch-room and Transformer Bays.

A small black-enamelled slate switchboard of the flat-back type is provided for controlling the station lighting, battery charging, breaker solenoid circuits, and other small d.c. supplies. The station lighting is

effected through two 62.5-kVA three-phase transformers connected to the busbars of the main auxiliary switchboard and stepping down from 420 to 190 V. The lighting circuits are connected between phases and neutral, that is, at 110 V. An automatic change-over switch is installed so that in the event of the failure of the a.c. supply various essential lamps can be automatically switched over to the d.c. battery. The lighting fittings were supplied by the B.T.-H. Co., and Messrs. Lee Beesley carried out the installation.

The boiler-house auxiliaries are controlled by four separate banks of iron-clad draw-out industrial pattern switchgear, each bank being fed by a separate feeder from the 420-V busbars on the main l.p. switchboard. Fig. 7 shows schematically the electrical connections throughout the station, and fig. 8 is a sectional drawing through the turbine room, switchgear compartments, and so on, depicting generally the plant lay-out. With the exception of two of the boiler feed pumps, all the auxiliaries are electrically driven, B.T.-H. motors and control gear being employed throughout. The cables employed in the station were supplied by Messrs Johnson & Phillips, Ltd., and Pirelli-General Cable Works, Ltd., and the pipework was supplied by Messrs. Aiton & Co., Ltd., and Messrs. Stewarts and Lloyds, Ltd.

# Oil-engine Exhaust Temperatures.

**Much information as to the running conditions of an oil engine can be obtained from a study of cylinder exhaust temperatures.**

By W. E. WARNER.

THE temperature of the exhaust from each cylinder of a multi-cylinder oil engine provides a useful guide as to the load balance between the cylinders and gives an indication of the performance of the engine as a unit, provided the theoretically correct exhaust temperature is known. The equal distribution of the load amongst the cylinders which must be obtained to secure good running is difficult to arrive at, particularly in the case of airless-injection engines as the cylinder performance is affected by inequality of leakage round the fuel pump plunger and fuel needle, wear of the valve-gear parts, and so on, defects which are outside the operator's control. Even if the power developed by the engine does not exceed its maximum rated capacity, any individual cylinder may be overloaded, owing to the others being out of condition, and this may result in damage to the overloaded cylinder. Bad load distribution also causes engine vibration.

Provided the exhaust temperatures are the same within a few degrees, it can be assumed that the conditions in all the cylinders are very similar. The temperatures can be measured by means of a pyrometer situated in the exhaust line from each cylinder, between the cylinder and the manifold; the pyrometer is screwed into the exhaust casing and connected to an indicating instrument situated in a place where it is easily observed and free from vibration. The operator can then keep the temperatures under close observation; any appreciable difference in the temperatures which occurs when the load is properly balanced points to some defect in a cylinder. Much depends on the completeness of combustion; each cylinder is designed to operate with a certain amount of excess air, usually about 20 per cent., with which a certain amount of oil can be efficiently burned. Increasing the fuel injected beyond this amount does not result in greater output, but simply leads to inefficient combustion, causing the exhaust to smoke and increasing carbonisation in the cylinder. This condition is shown by an increase in the exhaust temperature.

A smoky engine exhaust is often caused by only one or two cylinders, and by cutting down the fuel supply to those cylinders showing the highest exhaust temperatures, it will probably be found that the temperatures of the defective cylinders can be brought back to normal without any reduction in the output of the engine. Such a condition could easily be caused by leakages in the fuel-injection system. After-burning would, of course, be indicated by an excessive exhaust temperature, and the damage could be reduced by decreasing the load on the cylinder, until the engine could be stopped and the cause of the after-burning remedied. A burnt-out exhaust valve would also result in an excessive rise in the exhaust temperature, perhaps by as much as 200 deg. F. Similarly, a leaky exhaust valve would send the temperature up to an extent depending on the amount of leakage. A temperature rise on all the cylinders indicates a bad condition of the exhaust valves generally. In two-cycle engines the exhaust temperatures provide a guide as to the scavenging efficiency, an increased temperature denoting insufficient air entering the cylinder, owing to blocked ports, defective air valves, or some trouble in the scavenging compressor. A reduced exhaust temperature points to an excessive amount of the scavenging air being carried through the exhaust ports with the escaping gases, which might easily be caused by some defect in the air-baffling arrangements in the cylinder, such as carbon deposition, for instance.

Before judging an engine's condition by the exhaust temperatures, it is first necessary to know what the temperatures should be at different loads and speeds with the engine in good condition. This information could easily be supplied by the makers if they took note of the temperatures when the engine was on the test bed, and would be very helpful in obtaining efficient operation. Although under ideal conditions the cylinder exhaust temperatures would be exactly the same, it is impracticable to rectify small differences like 10 or 15 deg. F., as such a small out-of-balance could easily be caused by defects that are unavoidable.

Judging an engine's performance by means of indicator diagrams is open to many errors, particularly in high-speed engines with small cylinder volume, and as the shaft horse-power cannot be calculated unless the mechanical efficiency of the engine is known, the method may not be superior to judging the performance by the exhaust temperatures. For every engine there is a temperature limit for the exhaust gases, above which the engine cannot operate continuously. In experiments carried out in America this was found to be 968 deg. F. for a four-stroke engine running on fuel oil, and the limiting temperature was found to be the same after the engine had been adjusted to run on producer gas. The exhaust temperatures were found to be fairly consistent for engines of the same class working under similar conditions. The most economical exhaust temperatures for engines of the four-stroke type will be found to be between 720 deg. F. and 800 deg. F., the temperature being somewhat affected by the engine design. In two-stroke engines the most economical temperature is lower, between 600 and 700 deg. F., owing to some of the scavenging air being swept away by the exhaust gases.

A pyrometer installation will naturally increase the first cost of the installation, but as pyrometers have been found to retain their accuracy with increasing age, the better operation and economy obtainable should amply repay the cost of the indicating equipment.

# Overload Protection.

**A comparison between the four principal systems of overload protection at present in vogue, with notes upon some characteristics not generally apparent.**

By S. B. WARDER.

THE problem of providing overload protection for a circuit appears at first sight to be a simple one, but the number of methods available for adoption and the apparently slight though important differences in the inherent characteristics of each make the final choice no easy matter. There are at the present time at least four distinct forms of overload protection available, each having its own peculiar characteristic, and about twelve different methods of obtaining them. The systems referred to are: instantaneous overload protection; inverse time overload protection; definite time overload protection; and inverse and definite overload protection.

At first sight the instantaneous system of overload protection, obtained either by directly-acting trip coils or by relays, appears to meet the average requirements excellently, but consideration will show that this is far from true. For example, an overload of considerable proportions can easily occur as a result of transient loads caused by switching operations, the cold starting of motors on the circuit, surges, and so on, and it is objectionable that such momentary overloads should operate the breaker and shut down the circuit. Modern machines are well able to withstand very high momentary overloads without injury or falling out of step, and important circuits should only be disconnected from the busbars when conditions are so serious or sustained as to render it imperative.

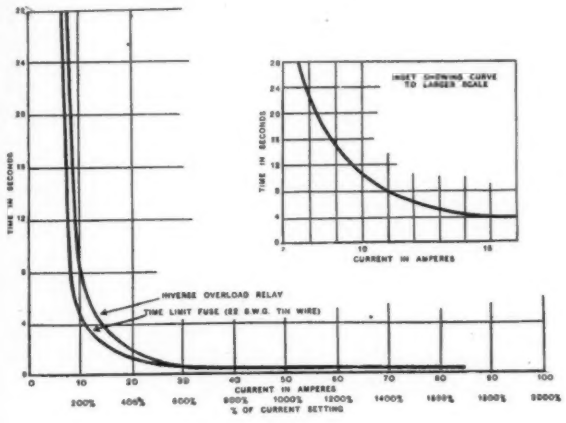
TIME IN SECONDS
INSET SHOWING CURVE TO LARGER SCALE
CURRENT IN AMPERES
INVERSE OVERLOAD RELAY
TIME LIMIT FUSE (22 S.W.G. TIN WIRE)
CURRENT IN AMPERES
% OF CURRENT SETTING

Fig. 1.

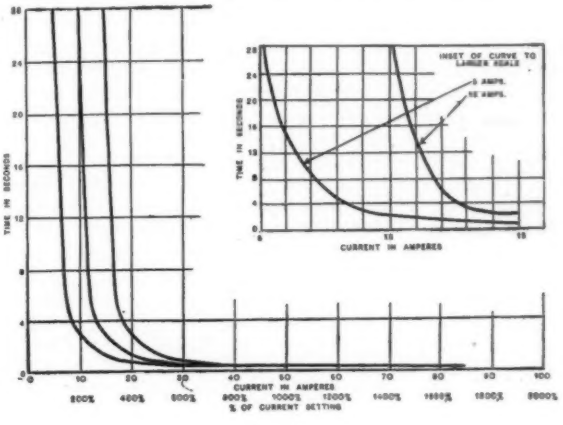


Fig. 2.

The circuit requirements met with in practice often demand that several breakers should be connected in series. In the event of a fault current traversing all the oil circuit breakers in series, it is desirable that only that breaker nearest the fault should operate. If all the breakers should operate simultaneously, grave dislocation of the circuit would result. It is therefore clear that some form of discrimination is necessary to render the overload devices inoperative upon overloads of a transient character, and to enable selective tripping of circuit breakers to be made.

The inverse-time characteristic obtained either by shunting directly-acting trip coils with time-limit fuses, or by the use of oil dash pots or relays, was developed to meet the requirement. This form of protection has the following characteristics: it operates after some delay upon a normal, but sustained, overload; operates almost instantaneously upon a heavy short-circuit; operates in between these limits for overloads between normal, full-load and short-circuit. The performance of this form of overload protection is shown clearly by the curve in fig. 1, which connects the time of operation with the magnitude of the overload for directly-acting trip coils shunted with time-limit fuses and also for inverse-time overload relays. The behaviour of the inverse-time relay with various current and time settings is shown in figs. 2 and 3 respectively. The time taken for the shunted trip coil to operate is affected by the overload setting of the solenoid plunger, but only to a very limited extent. If the operation requires adjustment, a different size of fuse wire has to be used, with the result shown in fig. 4.

Summarising the information obtainable from these curves, it can be seen that: (1) the time taken to operate by these devices is shorter the greater the degree of overload, and with heavy overloads of the order of 200 per cent. and over, both the fused trip coils and relays tend to lose their time-lagging properties and become almost instantaneous in operation; (2) the shape of the curves for the inverse-time relays is similar for all current and time settings, indicating that the relay characteristic is constant and unaffected by these settings; (3) the current and time settings of the inverse time relays are independent of one another; (4) no adjustments can be made upon the fused trip coil at all, other than by replacing the fuse itself, and the current and time settings are not independent of one another. The ease of adjustment of setting is an advantage with inverse-time relays, but if the correct size of fuse wire is used, highly satisfactory results can be obtained with fused trip coils upon similar circuits.

In practice it is generally found that delicate overload settings are neither desirable nor required, but the magnitude of the currents flowing during fault periods is so enormous that grave inconvenience is caused by overload devices of the ordinary type described above, because they lose their discrimination and time-lagging properties. On heavy short-circuits all such fused trip coils and relays connected in series would operate practically together, and so disconnect in a very short interval of time healthy as well as faulty sections of the system. This fact is often obscured by presenting the characteristic curves of the relays as shown in the inset figures. If the curves only go up to 200 per cent. or 300 per cent. overload, the loss of the time-lagging characteristics is not apparent, and a cursory examination of

them may lead to conclusions that are very far from true.

This difficulty can be overcome by using a definite time relay which allows the various relays connected in series to be graded in a progressive system of time delay, so obtaining discrimination in the disconnection of the sections. Such systems of graded time delay have been looked upon very favourably in America, but they lose the undoubted advantage of the inverse element which gives a discriminating operation for slight or severe overloads. Further, the advantage of discrimination these relays possess when connected in series is off-set by

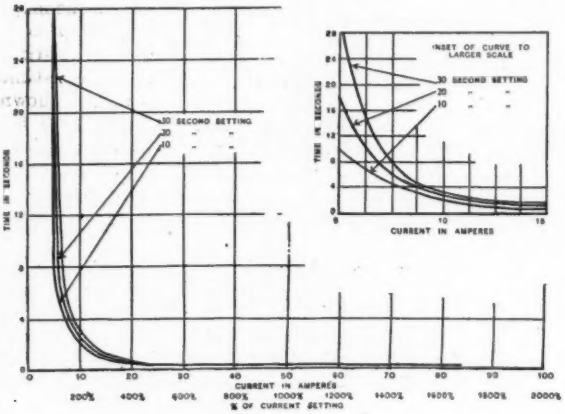


Fig. 3.

the fact that the time delay is shortest at the far end of the feeder, and becomes progressively greater as the generating station is approached. Just outside the power station, where the magnitude of the fault current is most severe and it is more important to clear the fault as rapidly as possible, the delay is longest, and at the distant end of the feeder, where the faults are not so severe and a longer delay might be justified, it is shortest.

The ideal relay would be one which would combine the good points of both the inverse and definite time overload relays. This has been actually effected in the inverse and definite time overload relay. This apparatus provides an inverse time characteristic to discriminate between momentary and sustained faults, and also has a definite minimum adjustable time of operation, so that even under the heaviest short-circuit conditions, dependable discrimination can be obtained with selective tripping of quite a large number of breakers in series. The

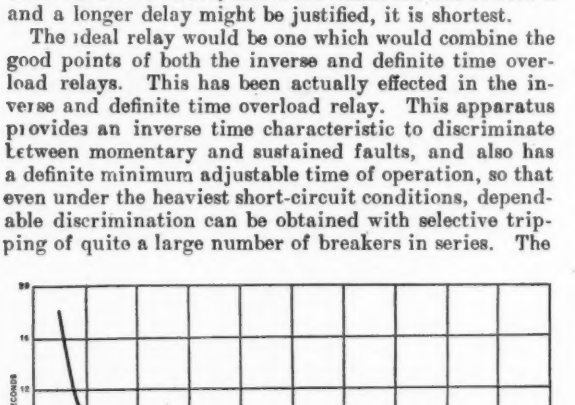


Fig. 5.

variation of time of operation with the magnitude of overload for relays of this type is given in fig. 5, from which it can be seen that they retain their inverse time characteristic for currents up to about 250 per cent. overload, after which they have a definite minimum time of operation. Up to 250 per cent. overload, the greater the current the shorter is the time required for the relay to operate, and for overloads greater than this the time of operation remains practically constant. Care must be taken in selecting the time setting to ensure that the minimum time delay is not extended too far. In practice a heavy overload is invariably accompanied by a sharp drop in voltage, and after a few seconds have elapsed synchronous machinery connected in circuit is liable to become unstable and fall out of step. It is found that a minimum time of operation of 2 or 3 seconds is long enough to provide selection among quite a number of breakers in series, and is sufficient for most practical requirements. The variation in the time of operation of the relay with time settings is given in fig. 6, from which it can be seen that the curves retain their shape for all settings. In other words, the relays retain their characteristics for all current and time settings.

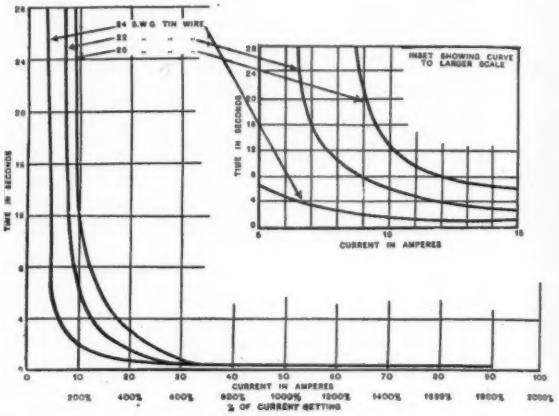


Fig. 4.

Having considered the various characteristics that practical requirements demand, it is now possible to see exactly how far these requirements can be met by the means at present available. When considering the question of selection, it is useful to divide circuits into two classes, those where selective tripping of the breakers connected in series is required, and those circuits in which this characteristic is not required. Considering circuits where selective tripping of breakers connected in series is not required, such as motor circuits and simple feeders, fairly high overload settings with a reasonable inverse time-lag is quite sufficient, and if the correct gauge of fuse wire is used with ordinary overload coils, or oil dash pots are adopted, they will be quite as satisfactory as any relay. The use of a relay in many cases means the provision of an auxiliary supply to operate the trip coil, which is not necessarily an added refinement.

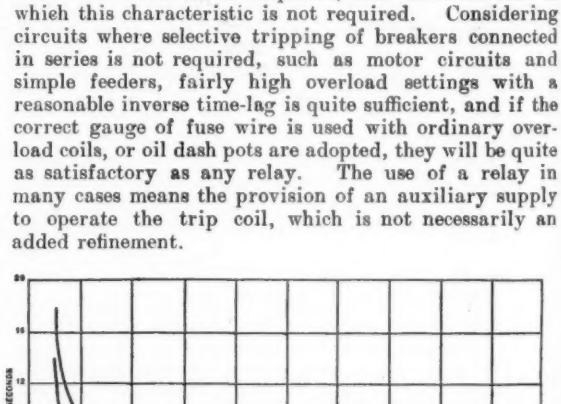


Fig. 6.

Where for some reason specially long delays are required, or the circuit under consideration requires selective tripping or independent adjustable current and time settings, the use of relays is indicated. For other circuits where more simple characteristics obtain, such devices as oil dash pots or fused trip coils should be used.

The fact that large circuits occupy more important positions on a system, rendering them more liable to cause or feel the effect of disturbances in it, quite often necessitates the use of relays, but it is interesting to note that it is the characteristics of the circuit and not its size which decides the choice.

# The Rating and Valuation Act.

## An Important Piece of Legislation for Traders.

By W. ERIC JACKSON, LL.B., Barrister-at-Law.

THE Government's new Rating and Valuation (Apportionment) Act will be of great interest to all whose business partakes of the nature of manufacture, and the terms of the Act deserve carful study. The greatest interest will, no doubt, arise when the actual de-rating of premises, which it is the purpose of the Government to carry out, is put into effect. As is well known, the object of the present legislation is to relieve productive industry of the rate burden which is said to press unduly heavily upon it, adding to the already high overhead charges which businesses have to bear. To this end the Act sets out in complicated and detailed terms the definition of those premises which are to be relieved when subsequently the de-rating takes effect.

The White Paper published some time ago by the Ministry of Health, states that it is the intention of the Government to relieve three classes of industry, namely, agriculture, transport, and manufacture. It will, of course, be chiefly the last which will interest readers of the ELECTRICAL REVIEW. It must not be supposed that every business of an industrial character is going to get relief. Premises or parts of premises used for a dwelling house, retail shop, distributive wholesale business or a public supply undertaking will not be entitled to any relief. In the term "retail business" is included repair work.

Accordingly, electric power houses, showrooms, repair shops where work is done for customers, warehouses and wholesale stores will be rated as now.

But the question is not quite so simple as that. There are many businesses which in one set of premises carry on several enterprises, retail selling and repair work, as well as the making-up of small accessories. And there are many manufacturers who have a showroom at or near the factory and do some sort of retail trade either from the showroom, or direct through the factory, by means of a mail-order trade. In such cases it will be no simple matter to decide exactly under which head the business should come, and to what extent, if any, it is to be relieved from rates.

The first test to apply is to inquire whether the premises are "occupied and used" as a factory or workshop. It is only premises of this class, which, according to Section 3 (1) of the Act can get relief at all. The definition of a workshop given in the Factories Acts is wide enough to cover many types of premises which are not exactly what might be called "industrial hereditaments" in the sense of the new Rating Act. Dressmakers' fitting rooms, garages, power stations, and packing rooms, are all within the definition of "workshop," but Section 3 goes on to say that if the premises, although partaking of the nature of a factory or workshop, and being within the definitions given in the Factories Acts, are really "primarily occupied and used for any of the purposes mentioned above, namely, retail business, public supply undertaking, wholesale business, &c.," they will not get relief under the new legislation.

The effect of these provisions may therefore be stated as follows: If the premises are primarily used for an excepted purpose, the fact that they are a workshop for the purpose of the Factories Acts will not entitle them to relief. The converse case is, however, not exactly parallel. A business which is primarily used as a factory or workshop, but contains a business of a character such as those which are excepted from the benefits of the Act, will be entitled to partial relief to the extent of the business of a manufacturing nature carried on.

It remains for traders to consider in what class their premises fall. The "primary use" is the deciding factor. If the primary use is that of a factory or workshop, then relief from rates in some measure may be expected, in spite of the fact that part of the premises is rated for a purpose which precludes exemption from rates. On the other hand, if the premises, although of the nature of a workshop or factory, are primarily occupied and used for a purpose which is not to be given relief, then no part of the premises will get relief, in spite of the fact that some sort of small manufacture or industry is carried on there.

It will be seen then that the Act favours the factory proper, and disfavours the pseudo factory. The practical effect of this will be difficult to gauge in the case of those numerous businesses which are partly manufacturing and partly otherwise. In any case the matter deserves looking into, and traders who consider that they have any chance of gaining the benefits of the Act should make application to the local rating authorities who are now in course of preparing their lists of exempted and non-exempted properties.

Section 4 of the Act gives in detail the method of assessing these mixed properties. Where the total annual value of the premises is £50 or less, then no division will take place and, provided the place is within the Act as an industrial hereditament, full relief will be given even if part of the premises is used for an excepted purpose. Where the annual value is more than £50, then if the value of the part used for an excepted purpose is less than 10 per cent. of the whole, it will not be taken into account, but will be ignored, and the premises will be treated as totally exempt. If the value of the part used for an excepted purpose is more than 10 per cent., then it will be separately valued and rated. But in such cases a 10 per cent. margin will be given in favour of the industrial part. This will operate as a sort of rebate; for example, take the case of a factory with a showroom. The value of the factory is, say, £450 per annum, the showroom £50; in such a case the premises will be treated as one industrial hereditament and be granted total relief, because the value of the showroom is not more than 10 per cent. of the whole. But if the value of the factory were £200 and the showroom £50, then 10 per cent. off the total vaue (£250) would be allowed before the ratable value, for the purposes of exemption, of the showroom was ascertained. In rating the premises, £225 would be considered as the value for industrial purposes, and £25 for other purposes. And since industrial premises are to get relief from rates to the extent of 75 per cent., this 10 per cent. "rebate" may represent a substantial advantage.

The circular published by the Ministry of Health, Memorandum R.V. (Apportionment), Rating and Valuation Act, 1928, is of great use in this connection, and gives useful examples to explain how traders should make out their claims. The Memorandum can be purchased from H.M. Stationery Office.

Examples may be quoted as indicating what is to be deemed part of the premises for the purposes of industry. Offices used by the general administrative staff or clerical staff, or research laboratories, drawing and designing rooms, caretaker's rooms, showrooms, &c., are not normally part of the factory and will be excluded from the relief. Recreation grounds, and a garage used for the storage or repair of road transport

vehicles are also outside the benefits of the Act. But courtyards, rest-rooms, a surgery, and any other such accommodation required by the Factories Acts will be treated as part of the factory and will be included in the relief. Similarly, packing sheds and warehouses which are within the curtilage of the factory will be deemed part of it, although if such sheds and warehouses were separate buildings situated some distance away, they would not be entitled to any relief at all.

It will be seen from this that the provisions of the Act are sufficiently complex to deserve careful study, and traders should be on the alert to see that they get all that they are entitled to when the rating assessor comes to make his assessment. In many areas, the local authorities have advertised that traders should make their own claims by an early date; in which case the matter should be carefully gone into, if possible with expert advice.

# Our Overseas Electrical Markets.

**Trend of trade with Australia, New Zealand, India and South Africa. Factors affecting purchasing power.**

SINCE our last quarterly review of the course of trade in Great Britain's chief electrical markets, viz., Australia, New Zealand, India, and South Africa (ELEC. REV., August 10th, p. 231), a partial set-back in two of these territories, *i.e.*, Australia and India, has been offset by a recovery in New Zealand and South Africa. The accompanying charts show the variations month by month in the electrical imports of the respective territories, and, in the case of India, the share of Great Britain compared with those of Germany and the United States.

### Australia.

In Australia the strike of the waterside workers has caused a set-back in trade, which was showing a distinct tendency to revive. Lack of rain in certain wheat-growing districts, notably Victoria, has also checked the optimistic feeling that was noticeable in business circles. Financial conditions have, however, improved, bank clearings in the principal cities showing an advance. The wool sales have proceeded satisfactorily, and buying from France, Germany, Japan and Russia, as well as Great Britain, has been active. Prices generally have been maintained. If the labour dispute at the docks proves to be settled, there is a good prospect of the

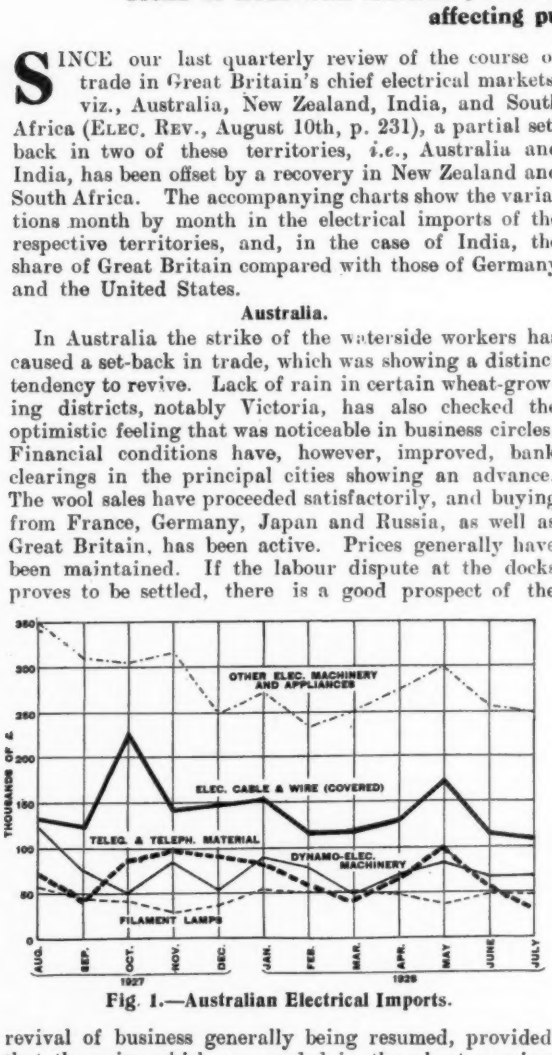


**Fig. 1.—Australian Electrical Imports.**

revival of business generally being resumed, provided that the rains which are needed in the wheat-growing areas arrive in time.

The potentialities of the Commonwealth as a market for electrical goods show no signs of diminution, as will have been gathered from Sir John Monash's and Mr. W. H. Alabaster's articles in a recent issue. How far British firms should tackle the market by resorting to the establishment of branch works remains a problem. At a recent meeting of Australian electrical manufacturers the President of the Association (Mr. Scanlan) criticised the Government's tariff policy as being directed rather to the collection of revenue than to the encouragement of the electrical manufacturing industry. He went on to refer to the fact that at least one of the largest importing houses in Australia, the Australian General Electric Co., Ltd., had considerably extended its manufacturing activities in New South Wales. He deprecated the cry for protection for anything and everything, whether commercially manufactured in Australia or not. Finally, Mr. Scanlan suggested the constitution of a board of experts to advise those anxious to embark on secondary industries upon such points as market research, finance, or the technics of the venture.

Meanwhile the agitation by the agriculturists and others in favour of a low tariff has induced the Prime Minister to appoint an Economic Committee to make a scientific investigation of the present tariff system. Although the manufacturers profess to see in this decision a threat to the existing policy of protection, it is not generally considered that any radical alteration will ensue.

While the production of both pig-iron and steel has recently been below the level of twelve months ago, a contract is reported to have been placed for steel works extensions in Newcastle, N.S.W., where modern coke ovens are to be installed at a cost of £1,000,000. There is discussion in Melbourne of a scheme for relieving the housing shortage in the State. If this matures, a sum of £1,000,000 will be expended. The market for radio

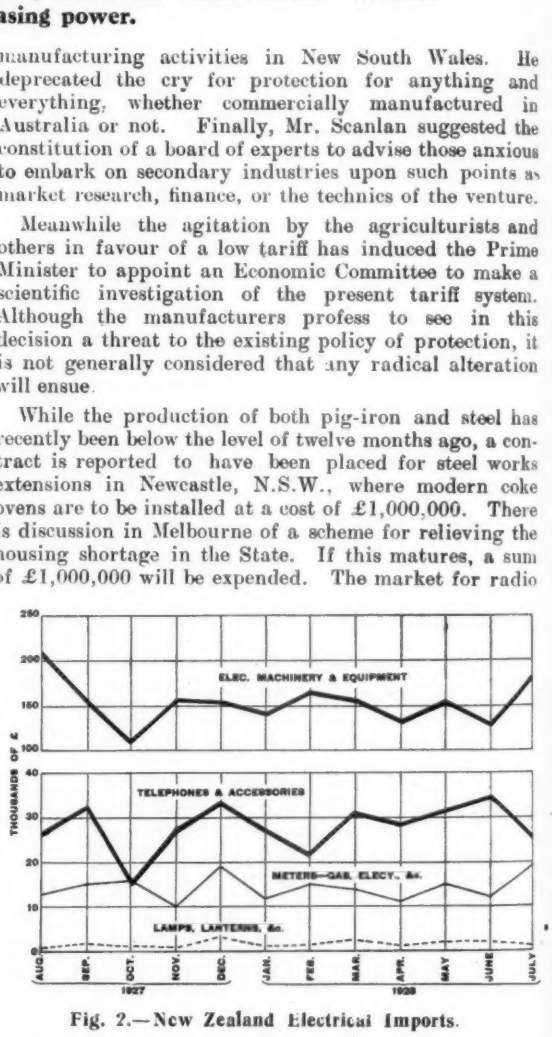


**Fig. 2.—New Zealand Electrical Imports.**

apparatus and domestic electric appliances is undoubtedly growing throughout the Commonwealth. For the fiscal year ended June last the value of electrical material as a whole imported into the Commonwealth showed a slight decline compared with the previous twelve months, the totals being £7,133,000 in 1927-28 and £7,435,000 in 1926-27. Imports of telegraph and telephone material showed an advance from £735,000 to £856,000, and cable and wire rose from £1,680,000 to £1,721,000, but imports of dynamos, batteries and accumulators declined in value.

### New Zealand.

Business conditions in New Zealand continue highly favourable, and a considerable amount of construction work is being planned. The depression of a few months

ago has now entirely cleared away, and bankers have consequently felt justified in reducing interest and discount rates from 7 per cent. to 6½ per cent., a move which is expected to stimulate import trade for a good many months. For the twelve months ended June last there was an export surplus of over £12,000,000, compared with an import excess of £978,000 in 1926-27 and one of no less than £5,820,000 in the previous year. For the first six months of this year exports realised an aggregate sum of £37,715,000, while imports totalled no more than £20,915,700 in value. July was a particularly favourable month for Great Britain in her *rôle* as supplier of the Dominion's requirements. Her share was 47.5 per cent. of the total. The present production of New Zealand's staple products—butter, cheese and wool—is on an unusually high level.

An officer of one of the electric power boards in the Dominion recently summarised the position with regard to supply as follows:—Electricity is now available to more than 90 per cent. of the population of New Zealand, and some 15,000 route miles of distribution lines have been erected. Including the Government plants, there are 48 public electric power stations in the country. There are approximately one hundred distributing authorities. Taking into account the Government schemes, some £19,000,000 has been invested in New Zealand in generating and distributing systems. The wiring of consumers' premises would probably add £4,600,000 to this total.

### India.

The commercial situation in India has suffered a partial reverse for two main reasons. First, labour trouble has been intensified, notably in the textile and steel industries; and secondly, in the north-west damage to the crops has been caused by heavy rains and insect pests. Elsewhere crop reports have been fairly satisfactory, and lately their condition has been stated to be fair on the whole, with irrigated crops average to good, but unirrigated below the average. The prices of the leading staple products, including cotton, wheat, jute, shellac and tea, have all been moderately firm during the past two or three weeks, after showing a declining tendency. The country still maintains a favourable balance of trade.

Hydro-electric developments continue to receive attention, and in Madras the chief engineer, Major H. G. Howard, has drawn up alternative schemes for the Pykara project, one of which is estimated to cost about Rs. 220 lakhs in the first year of operation, rising to Rs. 308 lakhs in the tenth year, and ultimately to

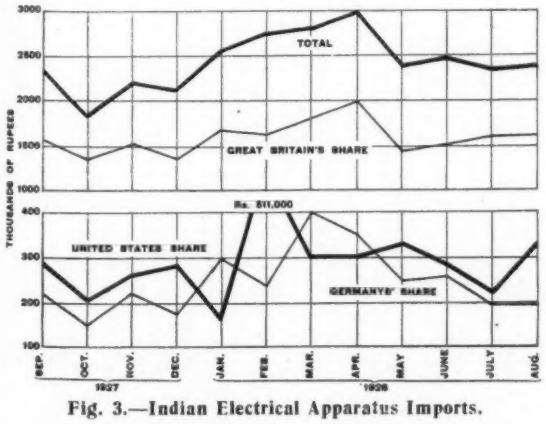


**Fig. 3.—Indian Electrical Apparatus Imports.**

Rs. 693 lakhs. Major Howard's schemes are being reported on by Messrs. Merz and Partners with reference to the question of railway electrification. In addition, it is understood that schemes have been worked out for the Papanasam project, which likewise entails a considerable expenditure. In the Vizagapatam district there are falls at Kolab capable of providing 56,000 e.h.p., part of which could be utilised by the harbour works.

The rather lukewarm attitude of the Linlithgow Commission on the subject of the future utilisation of India's vast sources of hydro-electric power has recently been criticised. It will be remembered that the Commission was inclined to consider that, beyond employment for urban and industrial purposes, there would not

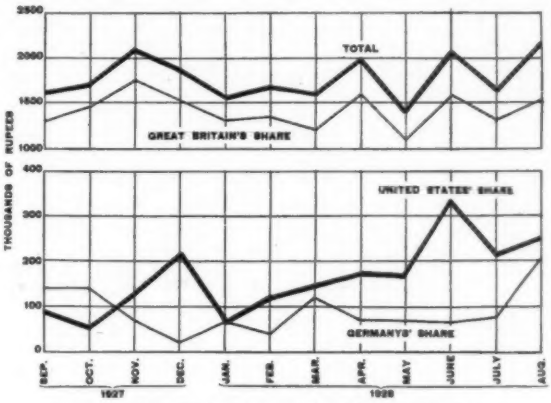


**Fig. 4.—Indian Electrical Machinery Imports.**

be much demand for electricity. *Capital* (Calcutta) has been discussing this matter. It is pointed out that the people in, for example, the Punjab do not live on isolated farms, but are concentrated in villages, mainly of considerable size, and in small towns. There should consequently be a demand for the operation of flour mills, sugar mills, chaff cutters, and the crushing of oil seeds of various kinds. If the proper organisation is set up for stimulating constant research on the subject of power, it is certain that steadily increasing advantages will accrue both to India and to Great Britain.

With regard to purchases by the Indian Stores Department, the existing rules may be followed by tenderers until December 1st next year, after which new regulations will come generally into force.

### South Africa.

Trading results in the Union of South Africa so far this year, compare very favourably with those for the corresponding period of 1927, while railway earnings have been well in advance of estimates. Wholesale dealings have been good, although in the Cape Peninsula unfavourable weather checked the usual spring revival of retail buying. In the central and eastern Free State there has been a lack of rain, and stock has been lost in consequence. The sale of motor cars and motor cycles—which is a barometer of trade activity—has been brisk in all centres except Durban. There has been an

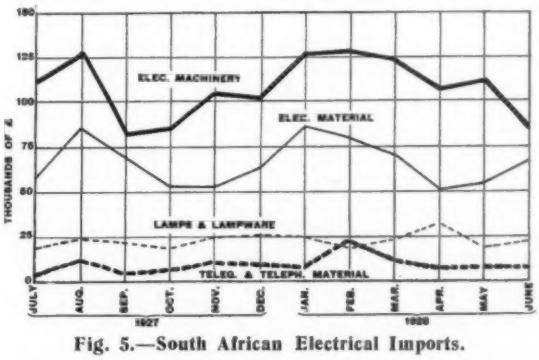


**Fig. 5.—South African Electrical Imports.**

increased turnover of mining material and machinery, while in agricultural plant business has been satisfactory.

The final estimate of the maize crop is 19,212,000 bags, an increase of about 300,000 bags over the previous forecast, owing largely to excellent results in the Transvaal. Thus for two years in succession the Union has reaped a really good maize harvest. Favourable prices have also been realised. At the same time the

wheat yield is expected to be normal, good rains having fallen when needed. As to sugar, the total crop is estimated at 273,500 tons, the yield being low owing to drought; the export surplus is about 67,200 tons. The season's shipments of wool are calculated at 285,000,000 lb. It may therefore be said that the leading agricultural products show satisfactory results. With regard to fruit, while shipments of citrus varieties have been below last year's level, those of dried fruits have advanced substantially. Last, but not least, the total mineral production of the Union (excluding diamonds) for the seven months, amounted to £28,577,000 as compared with £28,155,600 for the corresponding period of last year.

Figures published in connection with the Agricultural Census of 1926, testify in a striking manner to the favour in which electrical plant is held in the farming community. The number of dynamos and motors in use on European farms rose from 283 in 1921, to 1,302 in 1926, an increase of 283 per cent.

In Port Elizabeth between £35,000 and £50,000 is to be spent annually during the next four years on housing. The building trades generally are brisk almost everywhere.

# Business and Industrial Notes.

**The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.**

### The Electrical Industry: An Engineering Contemporary's View.

In view of the attention which some writers in the daily Press have been devoting to the position of the electrical industry, and the comments which we make in our leader pages to-day upon the great scope that lies before all branches of electrical development, we quote the following editorial notes from the pages of our contemporary *Engineering* (November 2nd, 1928). They form the introduction to a leading article, "The Health of Industry," summarising, and offering certain criticisms of, the presidential address of Lt.-Col. K. Edgcumbe, but they possess interest also in view of the depressing statements recently published elsewhere, and the controversy which has been taking place in one of the financial papers regarding the present market prices of various electricity supply securities, falls in which occurred simultaneously with a drop in quotations for electrical manufacturing shares. *Engineering* says:—"At the present time the British electrical industry is enjoying a fair degree of prosperity, and a retrospective glance will show that this statement could have been made with equal truth at almost any time during the post-war period. It is also capable of proof, whether we consider the results obtained on an absolute basis or whether we compare what has been achieved with the position in other trades. It is, in fact, not too much to say that those connected with other branches of engineering regard the successes of their electrical colleagues with a feeling akin to envy. Very many electrical manufacturing firms possess well-filled order books and are able to pay satisfactory dividends, while on the supply side, in spite of the coal strike and trade depression, the output of energy has increased at a more and more rapid rate each year. If this is the state of things when industry as a whole is stagnant, and money tight, it augurs well for the prosperity that will be enjoyed when the clouds pass away, as it is to be sincerely hoped they will before long.

"This being so, it is curious to find that the electrical industry itself is afflicted with a habit of introspection, which is so frequently indulged in and so deep-seated as to be almost morbid. This condition, as it often does when individuals are similarly attacked, results in alternating phases of joyous optimism and profound pessimism, which to the unbiased observer appear to be based as much upon an unintelligible inferiority-complex as on facts. There is indeed, it is easy to discover, too much self-analysis, and this is manifested in an outpouring of statistics and comment upon the real and supposed condition of the industry in its relationship to trade as a whole, and to what is being done in other countries which, whatever else it effects, must tend to encourage and render more dominant a state of mind, for which, intrinsically, there seems little or no justification.

"It would be easy to cite numerous examples of what we mean, and possibly to irritate or bore our readers by so doing. But it will be sufficient to refer to the inaugural address, which was delivered by Lieut.-Colonel K. Edgcumbe, the new president, to the Institution of Electrical Engineers on Thursday, October 25th, not because it displays undue morbidity or commits any flagrant errors of analysis, but because it affords an illustration of the habit of electrical engineers to dally with that pathological subject, economics, rather than to devote their best attention to those living problems, which are to be found in increasing measure within the confines of the activities with which they should be most immediately concerned."

While, as we stated last week, we thoroughly approve of the president's choice of his subject, and are in agreement with much of what he said in the address, we are also in agreement with our contemporary in the comments quoted above regarding "alternating phases of joyous optimism and profound pessimism" and "too much self-analysis." Too much thermometer is good neither for man nor for industry.

### The Sales and Advertising Departments.

The Engineering Section of the Incorporated Society of British Advertisers held its first luncheon meeting of the session on November 2nd. The chair was occupied by Mr. J. Taffs (English Electric Co., Ltd.), who referred to the activities of the Section and said, *inter alia*, that he hoped means would soon be found of inducing the publishers of trade papers to give advertisers particulars of their circulation. Mr. A. W. Swan (Evershed & Vignoles, Ltd.), the hon. secretary of the Section, reviewed the last session's meetings, and said that many new members had been gained. He introduced the speaker, Mr. F. Rowlinson (Mather & Platt, Ltd.), who delivered an address on "The Relations between Sales and Advertising Departments in Industrial and Engineering Companies." In the course of this the speaker said that in too many engineering concerns the two departments were separate entities owing mainly to the nature of the business. Most publicity men had to educate the general public, but the engineering industry's customers were well-informed and knew exactly what they wanted. The engineering publicity man's first task was to educate the sales manager, who more often than not had graduated from the works and had all kinds of misconceptions regarding publicity. One misconception was that engineering publicity should consist merely of hard facts. The advertising department should enjoy the full confidence of the sales department and should be an integral part of the organisation.

In a subsequent discussion, Mr. Knowles (Evershed and Vignoles, Ltd.) said that advertising was only one branch of sales activities. Publicity men were not always competent to deal with technical matters. Mr. C. Alderson Smith expressed a publisher's views, and Mr. Swan said that it was the business of the publicity department to create interest; when that had been done and inquiries came in, the business should be followed up by the sales department.

### A B.I. Ambulance Unit.

Some months ago, it was decided to form a unit of the St. John's Ambulance Brigade from among the Prescot employés of British Insulated Cables, Ltd., and classes have been conducted with such success that, at a recent examination, every candidate passed the required tests. On November 2nd certificates were presented to the members of the division by the managing director of the company, Mr. G. H. Nisbett, who said that such excellent results reflected great credit on their instructors, Miss S. Purdue and Mr. D. Pender, and on Dr. Orton, who had acted as lecturer to the classes. Mr. Nisbett also distributed prizes to the successful students at the various day and evening classes.

### Rubber Restriction Removed.

The restriction upon the exportation of rubber from British Malaya and Ceylon has been removed, after being in force for six years.

### The Metro-Vick and B.T.-H. Companies.

Some further comments upon the arrangements affecting the Metropolitan-Vickers Electrical Co., Ltd., the British Thomson-Houston Co., Ltd., the Edison Swan Electric Co., Ltd., and Ferguson, Pailin, Ltd. (*vide* our last issue, p. 753), appeared in *The Times* of November 2nd. It was stated that early this year the International General Electric Co. bought a controlling interest in the Metropolitan-Vickers Electrical Co. The International General Electric Co. proposed to form a British holding company to take over its interests in the British Thomson-Houston Co., and in the Metropolitan-Vickers Electrical Co., and also the shares of the Edison Swan Co., and Ferguson, Pailin, Ltd., the holding company to issue its own shares in exchange for the shares of the four companies mentioned. It was found, however, that the carrying out of this plan would involve considerable expense. It was therefore decided to take advantage of the fact that the Metropolitan-Vickers Co. had rather more than 3,000,000 unissued ordinary shares, and to convert this company into a holding concern. The Metropolitan-Vickers Co. has a subsidiary company, Metro-Vick Supplies, Ltd., all the shares of which it owns. The present Metropolitan-Vickers companies will in future be known as Metro-Vick Electrical Products, Ltd., and it will take over and handle the business carried on in the past by the Metropolitan-Vickers Electrical Co. The holding company will hold a majority of the shares of each of the four companies. The International General Electric Co. will not hold shares in any of these companies. Although it will be the largest individual shareholder in the holding company, it will hold less than a majority (in either value or voting power), and the majority of the holding company's shares will be held by British investors.

### The German Electrical Industry.

The *Deutsche Bergwerks Zeitung* says that in the third quarter of this year the German electro-technical industry was satisfactorily employed, especially the high-pressure section, so that some delivery periods have had to be prolonged. In individual branches which depend on orders for public services, however, there has been a decrease in business, for instance, in the telegraph and telephone branches, since orders from the Reichspost have practically ceased. Orders given by private customers are at low prices. On the other hand orders for radio material have increased with the approach of winter. For high-pressure materials numerous and extensive orders have been received. The factories producing machinery, high-pressure apparatus, high-pressure cables and meters, are therefore tolerably well supplied with work, and will be for the near future. The position in the electro-medical apparatus industry continues good. Business in incandescent lamps is still lively. —*Reuter's Trade Service* (Dusseldorf).

### Limitation of Exhibitions: International Conference.

The British Government is sending delegates to an international conference which opens in Paris on November 12th, for the purpose of discussing the question of the limitation and regulation of the number of international exhibitions and for concluding an international convention on the matter. A convention on this subject was signed at Berlin in 1912, but owing to the outbreak of war before ratifications had been exchanged, the convention never came into force. The main object of the conference will be to seek to limit strictly the long-period general exhibition, which is organised in many cases primarily for sentimental reasons, and where the commercial results likely to accrue to participants do not repay the cost of sending a creditable exhibit. It is understood that the British Government takes the view, after consultation with trade interests, that the short-period trade exhibition or fair stands in a different category and in the main is a valuable aid to business. The British delegates will be Sir Edward Crowe, C.M.G., Comptroller-General, Department of Overseas Trade, Colonel H. W. G. Cole, C.S.I., Director, Exhibitions Division, Department of Overseas Trade, Mr. J. R. Cahill, C.M.G., Commercial Counsellor, British Embassy, Paris. The delegates will be accompanied by Mr. W. E. Beckett, Assistant Legal Adviser, Foreign Office, Mr. Guy Locock, C.M.G., who has been nominated by the Federation of British Industries, by a representative of the Association of British Chambers of Commerce, and by Mr. L. A. de L. Meredith, O.B.E., and Mr. A. I. Schué, of the Exhibitions Division, Department of Overseas Trade.

### A Touring Radio Van.

Messrs. Philips Lamps, Ltd., have equipped a motor van with apparatus for radio demonstrations. The van is arranged to receive broadcast programmes and reproduce them by means of two cone loud speakers mounted on the roof, and there is apparatus for the electrical reproduction of gramophone records. The van is at present touring South Coast and western towns.

### All-British Switchgear.

Messrs. J. G. Statter & Co. have circularised the trade with the object of removing an impression that exists in some quarters that their switchgear is of foreign manufacture. All their switchgear is designed by them and manufactured at their works at Amersham Common, Bucks., of British materials only, and they have no connection with any foreign firm. They have specialised in switchgear manufacture for over thirty years.

### The F.B.I. "Business Barometer."

The Federation of British Industries has published its "Business Barometer" for the fourth quarter of this year. It commences with the query: "Are the methods of measuring trade activity and business cycles obsolete?" This has reference to the displacement of the basic construction trades as the expanding element of our industrial life, which, whether permanent or not, has left a definite mark on our industrial evolution. It is shown that even in a period of prosperity it is possible for the number of people employed to fall, while foreign investment, once an indication of trade potentialities, can probably no longer be relied upon as an index. Dealing with the outlook, the report says that the indices of trade activity show only a very moderate seasonal rally during the past quarter. The reports from the principal industrial districts, though more encouraging in character, do not indicate the existence of a sustained flow of orders. Exports of British manufactured goods were 3 per cent. higher than in the corresponding quarter of 1927, but imports of raw materials, which depend on manufacturers' estimates of future requirements, fell by an approximately similar amount. There was a marked fall in the price level, which appears to be a resumption of the downward movement which began in 1924, but was arrested by the coal dispute for a period. In the course of a forecast for the last quarter of the year the report says: "The outlook continues unsettled, but with the prospect of improvement in the New Year. . . . We do not look for any change in the present level of industry until the next few weeks have been safely surmounted."

### Proposed Co-ordination of the London Traffic System.

In connection with the recommendations of the L.C.C. Special Committee on Traffic for the co-ordination of the Council's tramways with the rest of the London transport services, Lord Ashfield, chairman of the "Underground" group, has made a suggestion that an Advisory Board should be set up. This Board would sit when the boards of the "Underground" companies were sitting, so that it would gain a knowledge of the undertaking as a whole. He suggests that the L.C.C. should nominate two members of the Board, the other municipal tramway authorities one, and the company tramways one, and to secure complete co-operation the chairman of the Underground Company should be chairman *ex-officio*. It is also suggested that the L.C.C. should have the right to appoint two representatives to the board of the Underground Company.

### Machines Displace Glassblowers.

The *Daily Telegraph* states that about 40 per cent. of the glassmakers who were lately employed at the Ponders End factory of the Edison Swan Electric Co., Ltd., were recently discharged. Mr. F. V. Hasemore, manager and secretary, informed our contemporary that the dismissals followed previous reductions in the number of workpeople consequent on the fact that electric lamp bulbs were now made by machinery instead of being blown by human agency. The change had been spread over several years, in which time the number of furnaces required had been reduced from four to one. "The adoption of mechanical means of production," Mr. Hasemore added, "has been hastened by the standardisation of electric lamp bulbs. Though we did not want to discharge our men, the time came when we had to change over to modern methods of manufacture."

### Central Scotland Scheme Contracts.

Contracts for switchgear in connection with the Central Scotland Electricity Scheme, amounting in the aggregate to about £18,000, have been placed by the Central Electricity Board with Messrs. A. Reyrolle & Co., Ltd. The equipment is for the stations at Dalmarnock, Port Dundas, and Paisley, and the sums involved in the three contracts are respectively about £10,000, £6,000, and £2,000.

### "Fifty Years of British Industry."

Sir George Sutton, Bt., gave an address bearing the above title at a meeting of the Royal Society of Arts on Wednesday last, upon his election as chairman of the Council of the Society. He reviewed the changes in industrial structure and methods during the past half century, and made special reference to the relations existing between employers and employés. In this connection he dealt with the part played by the Cable Makers' Association, which was a pioneer in the direction of industrial councils, and pointed to the success which had been obtained in the industry in the matter of settling difficulties of various kinds. Sir George briefly touched upon such questions as profit-sharing and co-partnership, and, while admitting that they were often excellent schemes, pointed out that their general application was difficult, if not impossible. Later in the address the speaker reverted to the work of the C.M.A. as a trade organisation, and said that the stability and prosperity of the cable-making industry bore witness to the success of an arrangement which was at first viewed with grave suspicion. He also made mention of recent developments in the direction of co-operative research, and concluded by stressing the need for the proper kind of education for industry and commerce, a matter in which the Royal Society of Arts had played a most distinguished and useful part. We hope to refer more fully to the address in a future issue.

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### Bankruptcy Proceedings.

E. J. G. Hurles (trading as "Industries Wireless Valve Co."), 8, Blackfriars Road, S.E.—The public examination of this debtor took place on October 29th, before Mr. Registrar Francke, at the London Bankruptcy Court, the accounts showing liabilities of £1,426, against assets "four bad book debts, £593." Questioned by Mr. B. Park, Assistant Official Receiver, the debtor stated that he began dealing in wireless valves in September, 1922, with £15 capital, but in August, 1924, a wholesale manufacturers' association was formed, against which he was unable to compete, and he thereupon ceased trading. In August, 1925, he and one Cole started business as dealers in wireless transformers and condensers at 69, Blackfriars Road, under the style of "Industries." They were elected members of the before-mentioned Association in November, 1925, and permitted to deal in wireless valves. The agreement with Cole was then dissolved on terms that witness took over the valve business and Cole retained the accessories business. He (debtor) thereafter traded as a wireless valve factor; the business was successful at first, but was adversely affected by keen competition. He was further handicapped by losses through bad debts, and he was compelled to resign from the Association in August, 1922; he owed £1,400 at the time. In December, 1927, he was re-elected a member on condition that he reduced his trade liabilities and that further goods were to be purchased on a cash basis. He was unable to comply with the conditions, and his membership was terminated on the making of the receiving order against him, which was based on a judgment obtained against him by a trade creditor. The debtor attributed his insolvency to lack of sufficient working capital, to keen competition, the gross profits from his business having been insufficient to meet the overhead charges, and to bad debts. Witness admitted that he had sold valves to one Armitage at cost price, and had, in addition, lent him money, his reason being to increase his own purchases and thus receive further bonuses and discounts, and, incidentally, to be able to enjoy larger credits. The examination was adjourned till December 14th.

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G. S. Hall (trading as G. S. Hall & Co.), electrical engineer, New Malden, Cheam and Ewell.—An application for an order of discharge was made to Mr. Registrar Francke at the London Bankruptcy Court on November 2nd by this bankrupt, who failed in June, 1927. The Official Receiver reported that the ranking liabilities amounted to £716, whilst the assets valued at £282 had only realised £24. His Honour granted a discharge subject to a suspension of four weeks, remarking that the bankrupt had conducted his business in a perfectly honest manner.

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Mabel Woolldridge (trading as the Woolldridge Radio Co.), 22, Lisle Street, W.C.—The first meeting of creditors was held last week at the London Bankruptcy Court, before Mr. D. Williams, Official Receiver. The debtor stated that she began business as a wireless dealer in partnership with another lady under the style of S. Hawkins, but the partner retired at the end of 1924, and she continued it alone until the beginning of 1926, when she closed down and sold the stock. In May, 1926, with another person, she formed the Woolldridge Radio Co., Ltd., with a nominal capital of £100, to carry on a mail order business for the supply of wireless goods on easy terms. The debtor was allotted 50 shares and became a director of the company which is now in the hands of a receiver for a creditor. Some time in 1926 M. Woolldridge Wireless Co., Ltd., was formed with a nominal capital of £1,500, to supply goods to the Woolldridge Radio Co., Ltd., and to carry on a cash business on the same lines. The debtor was allotted 298 shares and appointed managing director at a fee of £250 per annum, but the company barely pays its expenses, and no value is attached to the shares. The debtor roughly estimates her liabilities at £350, and has no assets, her position being attributed to the non-success of the above company. Mr. F. S. Salaman, 1 & 2, Bucklersbury, E.C., was elected trustee of the estate.

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G. Cohen, electrical engineer, 49, Newman Street, Oxford Street, W.—The receiving order in this matter was made on July 31st on the petition of creditors, and on November 2nd the first meeting of creditors was held at the London Bankruptcy Court. According to the debtor's statements, he traded, in the first instance, as the Reliance Electric Maintenance Co. and later as the Reliance Electric Co. He began business in 1901 with £45 capital, and since then had traded from several addresses. The trading was successful until this year, but depreciated in consequence of the slump. A draft statement of affairs was presented showing liabilities of £4,391 and assets valued at sufficient to yield a surplus after payment of all debts, but it was intimated that the figures might have to be amended. The meeting was adjourned for a fortnight to enable the debtor to submit a proposal.

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J. Cave and T. W. Bowler, trading as Taylor & Wynne, Back 180, Green Lane, Small Heath, Birmingham, electrical engineers.—A deficiency of £471 was shown in the statement of affairs presented at the first meeting of creditors held on October 26th, at the Official Receiver's Office, Birmingham. It appeared that the debtor Cave commenced business on his own account in December, 1921, with a capital of £5. He was joined in partnership in 1923 by the debtor T. W. Bowler. The latter's liabilities amount to £2, and his assets to £25, leaving a surplus of £23 to be transferred to the joint estate. The case, being a summary one, was left in the hands of the Official Receiver as trustee.

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C. J. Meredith, 36, Union Street, Torquay, electrician.—The receiving order in this matter was made on October 17th, on debtor's own petition, and according to the statement of affairs filed by him there are liabilities of £301, against assets of £29, leaving a deficiency of £272. The debtor commenced business on his own account in June, 1926. In December 5th, 1927, he took into partnership another, when a partnership deed was drawn up, but not executed. The partner later left the business. Debtor states that he became aware of his position in January last, but continued to trade, hoping to obtain more work. He attributes his failure to insufficient work, contracting at too low a figure in order to secure a connection, &c. The first meeting of creditors was held on November 2nd at the Official Receiver's offices, Exeter. The case being a summary one, was left in the hands of the Official Receiver as trustee of the estate.

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George Leonard Harvey, 255, Hurcott Road, Kidderminster, electrical engineer.—The public examination herein was held recently at the Town Hall, Kidderminster, and a statement of affairs was filed by the debtor showing liabilities of £269, against assets valued at £2 leaving a deficiency of £267. The debtor attributed his failure to losses of trade through an accident to a taxi-cab, heavy interest on borrowed money, and insufficient turnover on his electrical business. The Official Receiver applied for the examination to be closed, and the Registrar made an order accordingly.

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H. R. Warmington, electrical engineer and contractor, 26, Stackpool Road, Bristol.—Receiving order made October 25th, on a creditor's petition.

J. V. Westnutt, electrical engineer, High Street North, Dunstable.—Receiving order made October 27th, on debtor's own petition.

F. C. Sprague, electrician, 44, Victoria Avenue, Mumbles, Swansea.—Receiving order made October 25th, on a creditor's petition.

T. S. S. Southwood, electrical engineer, Pound Farm, Whyke Road, Chichester.—First meeting held November 8th, at the Official Receiver's Offices, 12a, Marlborough Place, Brighton. Public examination, November 21st, at the Court House, Brighton.

H. C. Sharpe, wireless engineer, late of 42, Molesworth Street, Wadebridge.—First meeting, November 6th, at the Official Receiver's Office, City Chambers, Catherine Street, Salisbury. Public examination, November 16th, at the County Hall, Dorchester.

W. L. Brown (Sewell & Brown), electrical and radio engineer, 6a, The Exchange, Muswell Hill, N.—Application for discharge to be heard at Carey Street, W.C., on November 27th.

W. K. Coxon and E. R. Weare (Western Mfg. Co.), wireless apparatus manufacturers, Nurshill, Lydney, Glos.—Trustee, Mr. C. Latham, 78, New Oxford Street, W.C., released June 22nd.

A. M. Edwards (Mansell Edwards & Co.), electrical engineer, 111b, High Street, Blackwood, Mon.—First and final dividend of 10¾d. in the £, payable at the Official Receiver's Office, 34, Park Place, Cardiff.

N. Tizzard (carrying on business with F. J. Tizzard as Tizzard Bros.), electrical engineer and contractor, 27, Dalkeith Street, Barrow-in-Furness, and 121, Market Street, Dalton-in-Furness.—Bankrupt's discharge suspended until November 21st, 1928.

P. F. Brittain, electrical engineer, 110, Cannon Street, E.C., &c.—Second and final dividend of 6s. 3½d. in the £, payable November 16th, at the offices of Messrs. Corfield and Cripwell, Balfour House, Finsbury Pavement, E.C.

### Company Liquidations.

J. T. Kemp, Ltd., wireless and electrical engineers, 13, Derby Road, Nottingham.—A meeting of creditors was held recently at Nottingham. Mr. C. Thompson, Commerce Chambers, Parliament Street, Nottingham, occupied the chair, and reported that a resolution for voluntary liquidation had been passed, and he had been appointed liquidator. A statement of affairs had been prepared which disclosed ranking liabilities of £4,773, all due to unsecured creditors, and net assets of £569, leaving a deficiency so far as the creditors were concerned of £4,204. The nominal capital of the company was £6,000, of which £3,250 had been issued, and was fully paid. The company was registered on February 10th, 1927, and between that date and October 31st, 1927, there was a net loss of £2,766 on the trading. Between October 31st, 1927, and October 8th last there was a further loss of £661. The deficiency was accounted for by these losses, together with the writing off of the goodwill, which stood in the books at £3,999, and the depreciation of the assets in the statement

of affairs. The creditors decided to confirm the appointment of Mr. Thompson as liquidator. The following are creditors :—

| | £ | | £ |
|---|---|---|---|
| Midland Bank, Ltd. ... | 1,545 | Hicks, Sir Maxwell ... | 50 |
| British Driver Harris Co. ... ... ... ... | 261 | Farr, J. & S., Ltd. ... | 47 |
| Electric Cables, Ltd. ... | 240 | Electric Supplies (Bloxwich), Ltd. ... ... | 43 |
| P. Spray ... ... ... | 235 | Midland Electric Mfg. Co., Ltd. ... ... ... | 45 |
| Falk, Stadelmann & Co., Ltd. ... ... ... | 206 | Blackwell, F. C., & Co., Ltd. ... ... ... | 35 |
| Perfecta Seamless Steel Tubes, Ltd. ... ... | 154 | Reeves & Co. ... ... | 41 |
| Bush, P. ... ... ... | 100 | Mark Davis ... ... | 35 |
| Arnorduct Cable Co., Ltd. ... ... ... | 94 | Magna Wire & Cable Co., Ltd. ... ... | 36 |
| A.E.G. Machinery Co. | 90 | Marconiphone Co., Ltd. | 33 |
| Kramusch, E. ... ... | 86 | Michaels & Sohne ... | 37 |
| Vac-Tric, Ltd. ... ... | 76 | Smith, C. H. ... ... | 38 |
| Segal, J., Ltd. ... ... | 66 | Belling & Co. ... ... | 33 |
| Siemens Bros. & Co., Ltd. ... ... ... | 54 | Houghton - Butcher (G.B.), Ltd. ... ... | 33 |
| General Accessories, Ltd. ... ... ... | 52 | E.A. Manufacturing Co., Ltd. ... ... ... | 30 |
| Revo Electric Co., Ltd. | 51 | | |

ALLAN CLEAVER & CO., LTD., 12, Holborn Viaduct House, E.C.—Under the compulsory liquidation of this company accounts have been lodged showing unsecured liabilities of £13,297 and loans on debenture bonds £5,872, against assets estimated to produce £11,509. The deficiency with regard to contributories is returned at £8,810. The Official Receiver reports that the company was incorporated as a private company in February, 1923, to acquire and carry on the business of importer and exporter then being carried on by Mr. A. J. Cleaver. On April 14th, 1923, the directors resolved to send a director named Kater to Germany to arrange for the purchase of various goods. As a result, large quantities of headphones were received and the company was able to market them at a profit, but they could not be obtained in sufficient quantities, and the gross profit was not sufficient to cover the overhead charges. In connection with another transaction the company had a claim for £7,500 as commission. About the end of 1925 the company made arrangements with the Telephone Fabrik Berliner for the sole English agency of a special lightweight wireless headphone. The business proved remunerative, but, it was alleged, the Telephone Fabrik did not keep its agreement regarding the sole agency. The English market became flooded with the headphones, and the company encountered strong competition. The wireless business finished in 1926, and except for some small transactions no further business has been transacted. The failure of the company is attributed by Cleaver and Peacock (directors) to the delay in the receipt of the benefit from a French investment, the failure to obtain payment of the £7,500 commission, and to liability on bills drawn by a director for which the company received no benefit. The Official Receiver considers that the failure of the company is directly attributable to mismanagement, and the unbusinesslike methods of the directors.

THOS. RIGBY, LTD., electrical contractors, Leeds.—A meeting of creditors was held on October 25th, at Leeds. Mr. S. Croudson, the liquidator, submitted a statement of affairs which showed ranking liabilities of £1,551, and net assets of £314, leaving a deficiency of £1,237. It was reported that the company was registered in December, 1920, to acquire the business of an electrical contractor which had been carried on by Mr. Thos. Rigby since 1897. The nominal capital of the company was £1,000, of which £853 had been issued, £301 for cash, and £552 to the vendor. In the first year the turnover was £1,865, and it gradually increased until, in 1925, it was £2,790. Since that time, however, the sales had declined, and, during the 54 weeks to October 10th last were only £1,446. The gross profit had ranged from 12 per cent. to 18 per cent., but in each year there had been a small net loss on the trading. The voluntary liquidation of the company was confirmed, with Mr. Croudson as liquidator.

BRITISH ELECTRIC & GENERAL INSULATORS, LTD.—Particulars of claims by December 5th to the liquidator, Mr. F. H. Harman, 8, Regent Street, S.W.

### Dissolutions of Partnership.

STANDARD ELECTRICAL ENGINEERING AND THE STANDARD ELECTRIC SIGN AND METAL WORKS CO., LTD., electrical engineers and contractors, 39, Eastcheap, E.C.—Mr. J. Akers and Mr. E. A. Galloway have dissolved partnership.

### Private Arrangements.

F. A. TAYLOR, trading as the Kingston Radio Supplies, Kingston-on-Thames.—A meeting of creditors was held on November 1st, at 24, Old Buildings, Lincoln's Inn, when the chairman, Mr. Hadden, stated that the liabilities were approximately £200, and the assets included stock £31 and a lease £15. In addition, the debtor's friends were willing to guarantee a sum of £50. There were also preferential claims of £27, respectively, which would be paid by the debtor's friends. If the bailiffs were paid out there would be a further asset for the creditors. It was decided that a deed of assignment should be executed to Mr. Hadden as trustee.

### Book Notices.

"Handling London's Underground Traffic," by J. P. Thomas, M.I.E.E., M.Inst.T. Quarto (8 in. by 6 in.); pp. 248; illustrated with 147 photographs, charts, and diagrams, and five folding plates. Price 7s. 6d. net. London: Underground Railway Co.—This is the first book to deal comprehensively and authoritatively with the organisation and operation of the Underground railways of London. Apart from the interest it should hold for the railway world and the public generally, it should prove of considerable service as a *vade mecum* to be consulted when information is required offhand respecting some particular feature of Underground practice. The original scheme of the author, who is operating manager of the system, was the preparation of a handbook for the employés, but it was subsequently felt that the subjects dealt with would have a much wider appeal, and that the work in its elaborated form would be a contribution to railway literature.

"List of Electricity Undertakings of Great Britain and Ireland, together with the Chief Towns in the British Empire." Pp. 32. London: ELECTRICAL REVIEW, Ltd. Price 1s. net, 1s. 2d. post free.—This booklet is divided into two sections, the first containing a list of some 1,800 towns or districts in the British Isles, and the second a list of approximately 250 of the principal towns in the Colonies. The lists are arranged in alphabetical order, the nature and pressure of supply being clearly set out, so that the voltage of any given place can be ascertained at a glance. The greater part of the information given is up-to-date, but in some cases, particularly in the British Isles, changes are being made in the system of supply, and in such cases the towns have been marked with an asterisk.

"Central Scotland Electricity Scheme." Pp. 16; figs. 7. Prescot, Lancs.: British Insulated Cables, Ltd.—This well-produced booklet deals with the design of the 132-kV overhead transmission lines, which differs in many respects from earlier British practice.

"Practical Colour Simplified," by W. J. Miskella. Chicago: Finishing Research Laboratories, Inc.

"Report on the Reform of the British Patent System." London: The British Science Guild, price 2s.

### New Catalogues and Lists.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.—Illustrated pamphlets, giving details and prices of the company's trickle chargers, h.t. supply units, loud speakers, &c.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—List No. 214, containing illustrated particulars of "Brook" high-torque a.c. motors.

BRITISH INSULATED CABLES, LTD., Prescot Lancs.—Publication No. P.243 (replacing P.221), illustrating and describing the company's single-phase electricity meters.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD., "Winder House," Rochester Row, S.W.1.—A pamphlet dealing with the "Avometer" current, pressure and resistance measuring instrument.

THE BENJAMIN ELECTRIC, LTD., Brantwood Works, Tariff Road, Tottenham, N.17.—List No. 1030, an illustrated and priced catalogue of "Benjamin" reflectors, and Publication No. 1008, describing the company's one-piece reflector.

MESSRS. A. J. ASHDOWN, LTD., 119, Victoria Street, S.W.—A booklet illustrating examples of mechanical power transmission gear made by Messrs. T. H. Dixon & Co., Ltd., Letchworth.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, E.C.4.—Catalogue No. 199, dealing with enclosed lighting units of many patterns. Illustrated and priced.

MESSRS. L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, W.C.2.—A series of pamphlet pages containing descriptions, illustrations and prices of domestic appliances, including fires, table devices, violet-ray apparatus, electric hair clippers, &c. Also a leaflet dealing with a window-lighting device.

MESSRS. WARREN BROS. (MIDDLESBROUGH), LTD., Grange Road West, Middlesbrough.—A publication advertising Howard's patent separator for boilers. Illustrated.

THE LONDON ELECTRIC STORES, LTD., 9, St. Martin's Street, Leicester Square, W.C.2.—A very comprehensive catalogue of radio sets, components, and accessories. All makes are dealt with and illustrations and prices appear.

MESSRS. VERITYS, LTD., Aston, Birmingham.—A wall sheet bearing illustrations, particulars and prices of "Maxlume" industrial lighting equipment.

THE MORTIMER ENGINEERING CO., 35-36, Aldermanbury, E.C.2.—An illustrated booklet and leaflet advertising the company's revolving tables for window displays, &c.

MESSRS. S. G. BROWN, LTD., North Acton.—The "Brown Budget" for October, containing well-illustrated articles and notes on the company's loud speakers and other radio products.

MESSRS. JOHN BELL & CROYDEN, 50, Wigmore Street, W.1.—A booklet entitled "Wave-length Therapy," dealing very fully with "Arnold" therapeutic electrodes for medical use.

Mr. CUTHBERT ANDREWS, 47, Red Lion Street, W.C.1.—An illustrated and priced pamphlet advertising "Candex" hot-cathode X-ray tubes.

October calendar-blotters have been received from the JACKSON ELECTRIC STOVE CO., LTD., 143, Sloane Street, S.W.1, and POPE'S ELECTRIC LAMP CO., LTD., 5, Arthur Street, New Oxford Street, W.C.2.

The LONDON ELECTRIC WIRE CO. & SMITHS, LTD., Church Road, Leyton, E.10.—A series of leaflets and two coloured

showcards advertising the company's coils, h.f. chokes and other radio products. In one of the showcards illustrations of the components appear in relief, a very effective method.

### The Commercial Travellers' Benevolent Institution.

This Institution has published a booklet entitled "80 Not Out," which contains a brief history of the undertaking, which was founded in 1849. Illustrations of the Union Hotel, Penzance, where the idea took shape, are included.

### The Sale of Appliances at Shipley.

At a meeting of the Shipley District Council on October 30th there was a discussion upon the question of discounts to contractors introducing business to the Council's new showrooms. It was pointed out that the neighbouring authority, Bradford, conceded discounts to contractors, and the local dealers would continue to take their business to that authority if Shipley refused to follow the same practice. It was decided that a discount of 25 per cent. should be given, the Council receiving 10 per cent. as a factor.

### New Swiss Company.

La Société de la Fabrique de Lampes à Incandescence is the name of a company which has lately been formed in Fribourg (20, Avenue de Gambach), to manufacture electric lamps.

### Export Credit Guarantees.

An extension of the scheme administered by the Export Credits Guarantee Department of the Department of Overseas Trade was introduced last week. This institutes a new form of contract, as an alternative to the existing form, which possesses greater facilities for the exporter of British goods in the insurance against credit risks in foreign markets, and enables the exporter himself to obtain credit from his bank at favourable rates.

### Local Exhibitions.

GUISELEY.—An exhibition of electrical appliances is being held at the Liberal Club, Guiseley, from November 9th to 19th, under the auspices of the Electrical Distribution of Yorkshire, Ltd.

PRESTON.—The Electricity Committee proposes to hold an exhibition in the Public Hall about March next, and the chairman, vice-chairman and engineer have been authorised to make the necessary arrangements.

BIRMINGHAM.—Electricity was strongly represented at a "Health and Hygiene" exhibition at Birmingham last week. A large stand was occupied by the Electric Supply Department, on which were shown new types of cookers, refrigerating equipment, tubular heaters, fires, wash-boilers, and a large variety of labour-saving appliances and lighting equipment. "Kelvinator" refrigerating equipment was shown by Mr. S. Hodgson, in conjunction with Messrs. Walker Bros., Birmingham, and the local branch of Frigidaire, Ltd., had an attractive display. Vacuum cleaners were shown by Hoover, Ltd., and the Gem Labour Saving Devices, Ltd., Birmingham. A comprehensive exhibit of "sun-ray" and other special lamps was shown by the British Hanovia Quartz Lamp Co.

LINCOLN.—We omitted to refer in our last issue to the "Magicoal" fire in the dining-room at the recent Lincoln exhibition, which was supplied by BERRY'S ELECTRIC (1928), LTD.

### Co-operative Lamp Production in Sweden.

It is stated that the Ko-operative Verband, Stockholm, proposes to establish a glow-lamp factory in Sweden for the initial production of 2,000,000 lamps per annum; the total Swedish consumption is from four to five times this number. Mr. Johansson, director of the concern, is reported to have stated that a lamp costs 1.35 kr. in Sweden and 1.07 kr. in Germany, but the factory to be established would be able to sell at 0.85 kr. per lamp.

### New Callender Department.

Owing to the development of business in cables for ships, CALLENDER'S CABLE & CONSTRUCTION CO., LTD., has established a special department to deal with this side of its operations. It will be under the charge of Mr. T. O. Callender, the only son of Sir T. O. Callender (managing director and deputy chairman), assisted by Mr. J. S. McCallum, formerly sales representative in Scotland, whose headquarters are in Glasgow, where, due to the number of shipyards on the Clyde, much of this business is to be found. This has meant rearrangement of the sales representation north of the Tweed, and Mr. W. A. Brown, M.I.E.E., has been appointed the company's sales representative for Scotland, with offices situate at 111, Union Street, Glasgow.

### A New Trade Association.

A group of large electrical merchants have felt for some time the necessity for an Association to protect the interests of those who hold a large stake in the industry and the necessary steps for its inauguration were recently completed in London. The necessary qualifications are that members must properly fulfil the functions of wholesale warehousemen, hold adequate stocks, give preference to British goods and generally assist sales progress by employing travelling representatives, publishing their own illustrated catalogues and popular literature for the use of the retail trade; and promote the establishment of fair retail prices and uniformity of discounts. The title of the new body is the Electrical Merchants' and Manufacturers' Association, Including Radio. We are informed that the initial membership includes the following: Messrs. Berry's Electric, Ltd., William McGeoch & Co., Ltd., Downes & Davies, the Sloan Electrical Co., Ltd., Drake and Gorham Wholesale, Ltd., the Sun Electrical Co., Ltd., and the Wholesale Electric Fittings Co., Ltd. The chairman of the Association is Mr. A. G. Beaver, and the present offices are at 118-20, Charing Cross Road, W.C.2.

### The New E.C.A. Sign.

The Electrical Contractors' Association announces that the new sign for the use of its members is now available. It takes the form of a sheet copper box of handsome lines glazed at both sides and at one end with duplex glass backed with opal. The Association's badge in black and amber appears on the two sides, while at the front end the letters "E.C.A." appear boldly. The sign is suspended from a handsome wrought-iron bracket which is supplied complete with a stay.

### Recent Contracts.

The ALTON BATTERY CO., LTD., has been awarded the contract for the battery plant required for the conversion of the Manchester telephone service to automatic working. The batteries will exceed 10,000-Ah capacity, and they will be unique in the respect that groups of plates in each cell and between individual cells in the battery will be interconnected by the special system of bolted joints designed by the Post Office Engineering Department. The company claims that the batteries will be the largest in the world in which this method of group connection is used, the largest cells at present installed on this system being of 6,580 Ah capacity, which were also manufactured by the company.

Messrs. RICHARD GARRETT & SONS, LTD., have received a repeat order from the National Electric Construction Co., Ltd., for a further twelve "Garrett" single-deck electric trolley 'buses for the Mexborough and Swinton Tramways—a contract amounting to some £20,000.

The EQUIPMENT & ENGINEERING CO., LTD., has received from the Ipswich Corporation an order for a special electromagnetic axle-testing machine. The Southend Corporation, the Bristol Tramways and Carriage Co., Ltd., and the Plymouth Corporation have placed orders with the company for phono-electric trolley wire.

The OMEGA LAMPWORKS, LTD., has received orders for "Omega" lamps from the Great Western Railway (twelve months' supply), the Great Southern Railway (Ireland) (twelve months' supply), and the Holborn Board of Guardians (six months' supply).

Period contracts for lamps have been placed by the Air Ministry and the Great Western Railway with SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., and with METRO-VICK SUPPLIES, LTD.

Messrs. W. CROCKATT & SONS, LTD., Glasgow, have recently received orders for their "Simplex" patent electric salinometers for Argentine, Chilean and Dutch destroyers; two outfits for Messrs. W. H. Allen, Sons & Co., Ltd., for use at the Edinburgh Corporation's Portobello station; and a large multi-point installation for the Dutch liner *Statendam* through Messrs. Harland & Wolff.

The four new 20,000-kW steam turbines with condensing plant and auxiliaries required for the Schaerbeek power station, Brussels, are to be of Brown-Boveri manufacture.

### For Sale.

Eccles Corporation Electricity Department invites offers for six steam-driven generating sets, and five Lancashire boilers with superheaters, economiser, boiler feed pumps, &c. Messrs. Fuller, Horsey, Sons & Cassell will sell by auction, on November 22nd and following day, at the Baltic Exchange, surplus electrical and wireless equipment lying at the R.A.F. No. 1 Stores Depôt, Kidbrooke, S.E. Mr. H. J. Shaw will sell by auction, on November 14th, at 13, High Holborn, W.C., the whole of the stock, office furniture, &c., of a wireless and electrical goods' merchant. (See our advertisement pages to-day.)

### New Municipal Showroom.

The Burnley Town Council has approved a scheme for the conversion of premises at 79, St. James Street for the purpose of a municipal electricity showroom, at an estimated cost of £2,800.

### Commercial Travellers.

Mr. Arthur Chamberlain, J.P., has accepted the presidency of the Electrical Trades' Commercial Travellers' Association for the coming year. The annual dinner and dance take place at the Hotel Cecil (Victoria Hall) on December 4th. Tickets (11s. 6d. each) can be obtained from Mr. J. W. Ward, 14, Weech Road, West Hampstead, N.W.6.

### International Lamp Industry Conference.

A conference recently took place at Brussels of representatives of the world's incandescent lamp industry. Germany, America, Japan, Belgium, Austria, Czecho-Slovakia, Holland, and France were represented, and the chief subject discussed was the question of "rationalising" the production of incandescent lamps. A committee was set up to examine the possibilities of increasing the output.—*Reuter's Trade Service* (Dusseldorf).

### South-East England Electricity Scheme Contracts.

The Central Electricity Board has placed contracts, amounting in all to more than £600,000, for the supply and erection of the 132,000-V outdoor switchgear for the South-East England Electricity Scheme as follows: For Part I, covering the northern portion of the area, with Messrs. A. Reyrolle & Co., Ltd.; for Part II, covering the southern portion of the area, with the English Electric Co., Ltd.

In our advertisement pages to-day the Central Electricity Board invites tenders for the supply, delivery, and erection of 33,000-V transformers in connection with the South-East England Electricity Scheme.

### Unemployment.

There was a further increase of 23,050 in the number of registered unemployed during the week ended October 22nd. The total at that date was 1,344,200, as compared with 1,321,150 on October 15th, and with 1,074,030 on October 24th, 1927.

### Social Events.

On completing the work of laying cables in the Plympton Council's district the staff of the Macintosh Cable Co., Ltd., was entertained at dinner at the Plympton Inn. The company numbered about thirty-five, and contributions to a musical programme were made by Messrs. Joslin, Grey, E. Jones, Edmonds, Barry, Chiswell and A. Medley.

Messrs. Veritys, Ltd., Aston, Birmingham, held their annual staff whist drive on October 30th at the Church House, Erdington, the chairman, Mr. George Verity, presenting the prizes.

### Trade Announcements.

The MIDLAND ELECTRIC CORPORATION FOR POWER DISTRIBUTION, LTD., has opened new showroom premises at 31, High Street, Stourbridge; Mr. S. P. Whelan is in charge.

Mr. K. M. HUGHES has been appointed sales representative in the areas of Lancashire, Cheshire, and North Wales, for the Electric Cooking and Heating Department of Carron Company.

WILD-BARFIELD ELECTRIC FURNACES, LTD., announces that in future the Hevi-Duty Electric Co., Milwaukee (Wis.) will manufacture and sell "Wild-Barfield" furnaces in the United States and Canada. The first public demonstration of "Wild-Barfield" furnaces on a large scale was given at the recent Annual Metal Exposition in Philadelphia.

The MULLARD COMPANY is opening a larger depôt at 9, Brunswick Street, Belfast, with Mr. L. H. Brown as manager.

### Prices of Raw Materials.

In their letter dated November 3rd, Messrs. James Forster and Co. state that after a period of steady markets during recent weeks the lead market became distinctly easier last week, particularly in the prompt position, owing no doubt to the near arrival of considerable quantities of lead. Consumption in this country is maintained at a steady level and owing to the scarcity of arrivals during the past two months consumers are all rather bare of stock. Demand on the Continent has been slightly better, but American lead is still on offer there in fair quantities. During October over 14,000 tons is reported to have been shipped from Australia, and with lead expected from other sources, it seems probable that a contango will again be established on the market very shortly. They look for a steady price for forward lead, with November falling to a slightly lower level.

Messrs. F. Smith and Co. report, November 6th:—Copper (electrolytic) bars, £75, 15s. inc.; ditto ditto sheets, no change; ditto ditto wire rods, £85, 15s. inc.; ditto ditto h.c. wire, 10 9/16d., 1/16d. inc.

Messrs. James & Shakespeare report, November 6th:—No change in the prices of copper bars (best selected), sheet and rod; English pig lead, £22 15s., 15s. dec.

Messrs. Edward Till & Co. report, November 6th:—No change in the price of India-rubber, Para fine.

Messrs. C. Clifford & Son, Ltd., report, November 6th:—Phosphor bronze, plane castings, no change; ditto, drawn bar and rods, 1s. 3½d., ½d. inc.; ditto, rolled strip and sheet, 1s. 3d., ½d. inc.; ditto, wire, 1s. 4½d., ½d. inc.

# Lighting and Power Notes.

**Brazil.**—HYDRO-ELECTRIC DEVELOPMENT.—It is announced that the State of Rio Grande do Sul will shortly call for public tenders for the construction and installation of hydro-electric power plants for furnishing an electricity supply to various municipalities in the State.

**Broadway (Worcs.).**—INAUGURATION OF SUPPLY.—An electricity supply provided by the Shropshire, Worcestershire, and Staffordshire Electric Power Co., was formally inaugurated on October 31st.

**Bury.**—LOANS.—The Town Council is to apply for sanction to borrow £20,000 for mains, and £10,000 for sub-stations.

**Canada.**—HYDRO-ELECTRIC DEVELOPMENT.—Hydro-electric power was recently switched on to Toronto from the new Paugan Falls plant of the Gatineau Power Company over the new 226-mile 220,000-V transmission line. In preliminary voltage tests, the pressure was 265,000 V, and later the Paugan Falls plant successfully took up a load of 10,000 kW, relieving the Niagara system of the Ontario Hydro-Electric Power Comsion to this extent. These tests were preliminary to placing the line in actual operation on October 1st, when the Gatineau Power Company commenced delivery of power to the Ontario Hydro-Electric Power Commission. The agreement provides for a maximum delivery of 260,000 h.p., but the initial delivery is 80,000 h.p. The 220,000-V line was constructed at a cost of about $25,000 per mile, or a total of approximately $6,000,000, the Gatineau Company building the line from Paugan Falls to the Ontario boundary at Chats Falls on the Ottawa River, where delivery of power is taken by the Ontario Hydro-Electric Power Commission and carried the remaining 200 miles to Leaside over a steel tower line erected by the Hydro-Electric Power Commission. Through the transforming and switching facilities provided at the Leaside station, Gatineau power becomes interconnected with the 110,000-V Niagara power lines and Ontario municipalities will be supplied from a generating and transmission system which stretches for a distance of nearly 450 miles across the breadth of southern Ontario.

**Congleton.**—ELECTRICITY SCHEME.—The Town Council has adopted a scheme for the supply of electricity in the borough, the estimated capital cost being placed by Mr. A. Ellis, the consulting engineer, at £45,740. The Council will take a supply of electricity in bulk, and the prospective price to consumers for lighting is 7d. per kWh.

**Continental.**—RUSSIA.—It is announced from Stockholm that a delegation of engineers from the Swedish Hydraulic Construction Bureau has recently left for Russia to assist with the working out of a large Soviet scheme. This concerns the establishment of hydro-electric works on the River Svir, which is the connecting link between the lakes of Onega and Ladoga. The Soviet authorities contemplate the construction of three hydro-electric works on the river in connection with large locks, and the lowest installation, with which the Swedes will first occupy themselves, is to be of 100,000 h.p., to cost 70,000,000 roubles and be completed in five years.

PORTUGAL.—According to the *Revista de Ingenheiros*, of Lisbon, there are now 59 hydro-electric power stations with a total capacity of 33,330 kW and 255 steam and producer gas or oil-operated generating stations totalling 100,826 kW in operation in Portugal, an aggregate for the country of 314 stations and 134,156 kW. Most of the plants are small, there being only five stations in the country with a capacity greater than 5,000 kW. Ten Portuguese rivers are being utilised to the extent of 49,368 h.p., and concessions have been granted in respect of new plants totalling 52,015 h.p. on seven of the rivers. It is estimated that another 1,714,950 h.p. is available, of which the major portion is that afforded by the River Douro, on which a large Spanish-Portuguese plant is to be established. The output of electric power in Portugal during last year amounted to 165,196,118 kWh, of which 48,408,658 kWh was supplied by hydro-electric stations and 116,787,460 kWh from steam and other plants.

**Dover.**—CHANGE-OVER.—In connection with the change-over the Corporation Electricity Committee has adopted a report by Mr. J. S. Highfield and decided to invite tenders for a new switchboard and laying a new feeder cable at an estimated cost of £3,800.

**Earby.**—ELECTRICITY SUPPLY.—The Electricity Commissioners have waived the objections of the Yorkshire Electric Power Co. to the Urban District Council's proposal to accept the tender of Nelson Corporation for bulk supply of electricity and it is proposed to proceed with the scheme. The Corporation hopes to lay the h.p. cables in less than three months.

**Gillingham (Kent).**—LOANS.—The Town Council has applied for sanction to loans of £10,000 for mains and £500 for domestic apparatus.

**Glasgow.**—INQUIRY.—The Electricity Commissioners have decided to hold an inquiry into the proposal of the Corporation to spend £237,000 on the reconditioning and extension of the plant at Pinkston power station. The permission of the Commissioners is necessary before any expenditure can be incurred in extending the plant, but the Corporation can proceed with the reconditioning without approval It is suggested that the proposed expenditure could be avoided by an agreement under which the Electricity Department would supply any extra power required by the Tramways Department.

**Guildford.**—LOAN SANCTION.D.—In connection with the bulk supply of electricity to Cranleigh, the Corporation Electricity Committee has received sanction to a loan of £6,520 for mains.

**Halifax.**—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer: Mr. F. N. Rendell-Baker) for the year ended March 31st last records a total income of £198,378, as compared with £217,578 in the preceding year. There was a decrease in working expenses from £136,734 to £101,192, and the gross profit was therefore £97,186, as against £80,844. To the gross profit was added revenue from other sources, making a total of £103,663 available, and after providing for capital charges there was a net surplus of £27,372, as compared with £14,188

in 1926-27. A contribution of £8,000 was made to the borough fund. The capital expenditure during the year amounted to £69,086, the chief items being £19,318 for machinery and £26,513 for mains and services. The sales of electrical energy increased from 25,906,213 to 28,975,575 kWh, and the maximum supply demanded from 14,100 to 16,100 kW. The average price obtained per kWh fell from 2.016d. to 1.647d.

**Hetton (Durham).**—STREET LIGHTING.—At a recent meeting of the Urban District Council it was reported that the Houghton-le-Spring and District Electric Lighting Co., Ltd., had written stating that it had now revised the specification and details of the proposed street lighting scheme in view of the new regulations of the Electricity Commissioners for the erection of overhead lines and also the erection by the company of several extensions of its mains since the first specification was prepared. The revised specification showed a saving on the original tender of £572, the original tender being £5,376 and the revised tender £4,804. The Council accepted the tender and authorised the clerk to raise a loan to meet the cost.

**Lincolnshire.**—INQUIRY.—An inquiry is to be held at Lincoln this month by Col. T. C. Ekin, for the Electricity Commissioners, into the proposals for the electrification of the county. Representatives of the Lindsay and Kesteven County Councils, and of most of the other authorities in the county will be present.

**Linlithgow.**—OVERHEAD LINES.—Permission was granted by the County Council at its last meeting to the Central Electricity Board to erect a main cable to be carried on masts 70 ft. high. Applications for laying cables from Bathgate to the new creamery at Bridgend in Edinburgh Road, Linlithgow and Station Road, Dalmeny, were also granted.

**London.**—FULHAM.—The Electricity Committee has decided to erect and equip a transformer sub-station in Rigault Road, to lay a cable from the High Street to the sub-station, at a cost of £1,400, and to erect a sub-station at Baron's Court, to meet the demand of new houses and flats in course of erection, at a cost of £1,081.

**Manchester.**—PROGRESS DURING SEPTEMBER.—During the month of September the Corporation electricity undertaking showed an increase in connections of 2,079 kW, bringing the total up to 364,436 kW; and the number of applications received for supply, including those for additional supplies, was 1,345, representing a total of 2,504 kW. The number of hired cookers connected increased by 74, bringing the total actually on circuit to 4,805. Applications for the hire of cookers totalled 91. A new sub-station was put into commission at Messrs. Oldham & Sons' premises, and new plant installed at four existing sub-stations. The change-over from d.c. to a.c. has been completed in seven areas, and part of an eighth, involving a total to date of 2,425 consumers. The Electricity Commissioners' returns of the principal operating statistics for the whole of the generating stations in Great Britain have been published for the year 1927-28, and, as in previous years, the Barton station comes first in order of merit for thermal efficiency.

LOAN.—Application is being made for sanction to a loan of £50,000 for feeder mains.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

LONDON.—*Brompton and Kensington Electricity Supply Co., Ltd.*—Lighting: 5d. per kWh. Cooking, heating, and power: 1d. per kWh.

DERBY.—Lighting: First 1,000 kWh per quarter, 4d. per kWh; next 1,000 kWh, 3½d.; over 2,000 kWh, 3¼d. Power: From 1½d. to 1¼d. per kWh; combined scale, the "unit" charge from 0.7d. to 0.6d. for the first 150,000 kWh per month, and 0.5d. for energy in excess of this amount. Heating: From 1¼d. per kWh to 1d. for over 2,000 kWh per quarter, and ¾d. per kWh for over 4,000 kWh.

GLOSSOP.—*Urban Electric Supply Co., Ltd.*—Lighting: The maximum charge to be reduced to 8d. per kWh.

CLYDE VALLEY.—*The Clyde Valley Electrical Power Co.*—Rental tariff for houses, business premises, churches, &c.: The "unit" charge reduced from ¾d. to ½d. Two-rate tariff: Supply to houses reduced to 4½d. and ¼d. per kWh; supply to business premises reduced to 5d. and ¼d. per kWh.

**Rotherham.**—LOAN.—The Town Council is to apply for sanction to borrow £15,000 for the erection of a pumping plant for the electricity works. It was stated at a recent meeting that the load on the works was showing a rapid increase.

**Shavington.**—STREET LIGHTING.—The Nantwich Rural District Council has accepted the offer of the South Wales Electrical Power Distribution Co. for public lighting in the district at an all-in cost of £3 6s. 6d. per lamp, for a period of ten years.

**Shipley.**—LOAN.—The Urban District Council Electricity Committee is to apply for sanction to a loan of £10,000 for mains.

**South Africa.**—BLOEMFONTEIN.—The ratepayers have recently sanctioned the raising of a loan of £64,000 for additional plant at the electricity works.

PORT ELIZABETH.—The *South African Engineer* reports that a further stage has been reached in the Port Elizabeth-Uitenhage 20,000-V transmission scheme, by the completion of the underground section to the Eastern Province cement works. This section was recently officially tested at a pressure of 50,000 V, d.c., with satisfactory results.

**Special Orders.**—Application has been made to the Electricity Commissioners by Congleton Corporation for a Special Order authorising it to supply electricity in the borough and in the urban district of Buglawton.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them constituting a Joint Board consisting of representatives of the Urban District Councils of Alderley Edge and Wilmslow, and authorising Lytham St. Anne's Corporation to supply electricity in the rural district of Fylde.

**Spenborough.**—LOANS.—The Urban District Council decided on October 30th to apply for sanction to loans totalling £3,825, for extensions of the supply system at Scholes and for the establishment of an assisted wiring scheme.

# Tramway and Railway Notes.

**Blackpool.**—YEAR'S WORKING.—The report of the general manager of the Corporation tramway undertaking (Mr. C. Furness) for the year ended March 31st last, shows a total income of £314,329, and working expenditure of £218,560, leaving a gross profit of £95,769. The figures for the preceding year were: £279,985; working expenses, £200,177; gross profit, £79,808. To the gross profit was added a gross profit of £11,761 from the motor-omnibus service, and revenue from other sources, making a total of £111,328 available. Capital charges absorbed £42,357, and there was a net surplus of £68,971, as compared with £47,237 in the preceding year. A contribution of £18,000 was made to the borough fund. The capital expenditure during the year amounted to £60,741, and included £11,575 for permanent way and £18,062 for cars and other rolling stock. The number of passengers carried increased from 41,880,646 to 47,239,643, and the car miles run from 2,880,138 to 3,274,741. The receipts per car mile fell from 23.33d. to 22.95d.

**Brazil.**—RAILWAY ELECTRIFICATION.—The State of Rio Grande do Sul has under consideration the electrification of the railway between the cities of Santa Maria and Porto Alegre, a distance of 245 miles.

**Chesterfield.**—RAILLESS CARS.—The Town Council has approved the extension of the railless-car system to New Whittington, at an estimated cost of £5,040.

**Continental.**—ITALY.—The newly electrified tramway between Milan and Gorgonzola has been opened in the presence of representatives of the municipal authorities and directors of the various tramway companies in the Province. With the electrification of this line the programme for transforming the old steam tramways leading into Milan has been put into execution. Other sections will soon follow, *viz.*, the Milan-Vimercate, Brugherio-Monza and Gorgonzola-Vaprio. The Milan-Gorgonzola section is about 20 km. (12½ miles) long. The powerful locomotives (420 h.p.) allow of trains of five or more trailers, carrying in all over 600 persons, being used in the morning and evening rush hours. A speed of 50 km. an hour (about 31 miles) can be attained with a normal load, and the time taken on the journey will be reduced from 80 to 48 minutes.—*Reuter's Trade Service* (Milan).

FRANCE.—A scheme is being brought forward in Paris for the amalgamation of the two underground electric railways, the Metropolitan and the North-South line, on the basis of the exchange of five shares in the latter company for two shares in the former. A fusion could only take place with the consent of the City Council, and doubts are entertained whether this will be obtained.

GERMANY.—The *Daily Telegraph* reports that the proposal to amalgamate the Berlin tramways, 'buses, and underground railway into one company has now been definitely approved by the Budget Committee of the city "parliament."

**Egypt.**—RAILWAY ELECTRIFICATION.—The Egyptian State Railways are inviting tenders for the electrification and equipment of the Cairo-Helouan line, twenty miles in length.—*Reuter's Trade Service* (Cairo).

**London.**—L.C.C. TRAMWAY SERVICE.—The winter programme of the L.C.C. tramways will include an additional 250 Pullman, cushion-seat cars, bringing the total up to 850.

BREAKDOWN.—A short circuit on the electrified section of the Southern Railway caused a breakdown in the service between St. Paul's station and Herne Hill on October 31st, which lasted for an hour and a half.

IMPROVEMENTS AT KING'S CROSS.—Work is about to commence on alterations at King's Cross Station (City Railway) which will lead to considerable improvements in the booking arrangements there. The system known as "Lift Passimeter Control" is being adopted. This system has given excellent results at London Bridge and Angel Stations, and provides for the booking clerk having in his office complete lift control

mechanism and the latest type of rapid printing and issuing ticket machines. By these means both the lift service and ticket service are considerably accelerated. It is expected that the new facilities will be available early in December.

**South Africa.**—RAILWAY ELECTRIFICATION.—The *South African Engineer* reports that the Capetown suburban railway passenger system has been put into full electrical operation on the accelerated service with an increased number of trains. During the first six months of this year, the number of passengers carried on the suburban services under steam operation was 4,921,122, as compared with 5,085,337 during the corresponding period of 1927, but a considerable improvement in the number of passengers carried by the Sea Point line was noted immediately upon electrification, and during the quarter ended June last, the number carried was 1,018,674, as compared with 607,556 for the quarter ended June 1927.

**United States.**—RAILWAY ELECTRIFICATION.—The new York correspondent of *The Times* reports that the Pennsylvania Railway Co. has decided to spend $100,000,000 (£20,000,000) to electrify its entire train service between New York and Wilmington, Delaware, covering 325 miles of line and 13,000 miles of track. It will purchase its electric power from the Public Service Corporation of New Jersey and the Philadelphia Electric Co. General W. W. Atterbury, president of the company, states that it is to be accomplished over a period of about six years. The policy of the company would be to electrify its lines in congested areas and, as conditions warranted, to electrify gradually the lines between the congested areas. This policy has been practised in and about Philadelphia and New York, and on Long Island. The board of directors has had an extensive traffic survey made of the territory served by the Pennsylvania railway, which indicated that by 1950 the Metropolitan area would extend from New Brunswick, New Jersey, to well out on Long Island, and would have a population of 30,000,000. A similar development is anticipated in other cities. Among the facts influencing the decision to electrify a large section of the road are the growth of the company's Southern passenger business, greater economy of electricity over steam in congested areas, and the increasing density of traffic, both freight and passenger, on the Eastern lines. The Pennsylvania Railway has 21,000 miles of line, and it is expected that ultimately all this will be electrified.

# Telegraph and Telephone Notes.

**B.B.C. Relay Stations.**—SINGLE WAVE-LENGTH.—Interference by certain Continental stations having caused considerable trouble to relay stations in this country, the B.B.C. has decided, as an experiment, that in December all relay stations shall broadcast on one exclusive wave-length, namely, 288.5 metres.

**Brazil.**—RIO DE JANEIRO.—The projected law of the municipal council authorising the Prefect of the city to call for public tenders for a new concession for the telephone service of the Federal district, was approved on October 5th. It is now awaiting the sanction of the Prefect.

**India.**—TELEPHONY.—Arrangements have been completed for the introduction of a telephone system throughout Chitral. *The Times* states that telephones have already been installed in the most important towns. The Mehtar of Chitral will visit the Viceroy in Delhi soon.

**Radio Telephony.**—JAVA TO U.S.A.—A *Reuter* message from Sydney (N.S.W.) states that two-way conversations were held on October 31st by wireless telephony over a triangular circuit including Sydney, Java, and Schenectady (N.Y.). The transmission was said to be most successful.

**Seychelle Islands.**—RADIO STATION.—A complete wireless station among the Seychelle Islands, in the Indian Ocean, is for sale. It was built during the war for the Navy, but the Admiralty wants it no longer, and the Governor of the Seychelles invites tenders from anybody who wants to buy it.

**The Telephone Service.**—PROPOSALS FOR DEVELOPMENT.—The Prime Minister has informed the Telephone Development Association that he is giving consideration to suggestions for intensive telephone development, which have been submitted to him by the Association, as a means of creating widespread employment at no cost to the country. During the past five years, the Association points out, the gross income of the telephone service has been more than £76,500,000, out of which over £17,500,000 has been paid into the Treasury by way of interest and trading profit, and over £33,000,000 has been expended on P.O. telephone salaries, wages, and pensions. What is needed is courage to embark on a plan of extensive construction of telephone plant and an intensive publicity campaign to ensure that the new plant shall become revenue-earning without loss of time. If this were done immediate and remunerative employment would be created in many industries, including those of telephone instrument makers, cable makers, wire drawers, accumulator makers, &c.

EXPANSION.—The 600,000th telephone was installed in the London area last month, which figure represents more than a third of the total number of telephones in Great Britain and Northern Ireland, which is estimated to be about 1,730,000. Six new exchanges were opened in London during September, and ten were extended, whilst nine of the bigger provincial exchanges were enlarged. In August, 1,677,956 telephones were in operation, representing an increase of 8,862 over the figures for the previous month. In the London area 2,789 additional telephones were installed, and 6,073 in provincial districts.

**Transatlantic Telephony.**—PUEBLA.—The Postmaster-General has announced that the transatlantic telephone service with Mexico (in addition to the towns in Mexico to which the service has already been extended) is now available to the town of Puebla, in the State of Puebla. The charges for a call to Puebla from any place in Great Britain are £12 minimum, covering three minutes' conversation, and £4 per additional minute or fraction thereof. The "report charge" where applicable is £1. Subscribers wishing to book a call to a place in Mexico should ask their local exchange for "American Service."

NEW SERVICE.—A *Reuter* message from New York states it is now possible, through the medium of the transatlantic wireless telephone to Rugby, to call up Vienna from New York.

# Radio Notes.

**Australia.**—N.S.W.-U.S.A. PROGRAMME.—A Sydney correspondent of *World Radio* reports that a scheme is being worked out between the New South Wales Broadcasting Co., Australia, and the National Broadcasting Co. of America for an interchange of programmes on a basis new in the history of radio. The idea is for each station to broadcast items alternately, each taking the other's items and rebroadcasting them in between. Each station would transmit on two wave-lengths: the ordinary wave used for local broadcasting and a special short wave for long-distance work.

**B.B.C. Time Signal.**—NOTICE OF ALTERATION.—The B.B.C. announces that the Greenwich time signal is now broadcast at 6.15, instead of 6.30 p.m.

**Germany.**—LICENCES.—The number of broadcast receiving licences issued in Germany reached a total of 2,334,253 on October 1st, an increase since July 1st of 50,005.

**India.**—BROADCASTING.—The *Financial News* reports that Marconi's Wireless Telegraph Co., Ltd., has consented to finance the Indian Broadcasting Co., whose prospects hitherto have been so unsatisfactory, resulting in the recent resignation of five of the leading members of the European staff, including Mr. Eric Dunstan, general manager. Mr. Sultan Chinoy, a director of the Indian Broadcasting Co., has just returned to Bombay from England, where he appealed for support for Indian broadcasting on the ground that the Indian Radio Telegraph Co., which is associated with the Broadcasting Co., would suffer.

**United States.**—BROADCASTING.—A survey prepared for the National Broadcasting Company shows that there are 9,640,348 families operating receiving sets in the United States, with an estimated audience of 41,453,496.—*Reuter's Trade Service* (New York).

### Lloyd's Register of Shipping.

The report on the above Society's operations for the year ended June 30th last shows that the vessels classed by the Society during that year numbered 578, of a gross tonnage of 1,885,533, against 978,146 tons for the previous year. Plans were approved during the year for 476 vessels, representing 1,454,050 tons; 102 ships, of a total tonnage of 587,491, were built under the Society's inspection during the year for carrying oil in bulk. Of the total tonnage classed during the year, 431,391 tons, or 40.6 per cent. (91 ships) represents vessels fitted for burning oil fuel. At July last the gross tonnage of ships fitted for burning oil fuel (not necessarily actually using oil) was 19,053,014, against 18,481,759 for the previous year. Plans have been approved for the fitting of an installation which is capable of effecting the pulverisation of coal on board ship, and its subsequent delivery into the furnaces. There are now being constructed under the Society's survey, 17 double-acting Diesel engines of a total of 180,000 i.h.p. At July last there were 2,933 motor ships (5,432,302 tons) on the register, against 2,552 (4,270,824 tons) for the previous year. Special reference is made in the report to the turbo-electric drive installation on s.s. *Viceroy of India* and the Diesel-electric drive on oil tanker *Brunswick* (ELECTRICAL REVIEW, September 21st, 1928, pp. 467 and 487). During the period under review refrigerating installations were fitted in 62 vessels.

# Contract Information.

**When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.**

## Contracts Open.

**Australia.**—Melbourne.—November 28th. Victorian Railways. One 10-ton overhead electric crane. (A.X. 6951.)*

December 18th. Department of Posts and Telegraphs, motor-generator sets. (B.X. 4810.)* Lamps, lamp caps and sockets. (B.X. 4918.)*

December 11th. Telephone generators. (B.X. 4812.)* Instrument cords. (B.X. 4811.)*

December 4th. Submarine telephone and telegraph cable. (B.X. 4818.)*

December 5th. City Council. Insulated fire-resisting cable. (B.X. 4822.)*

**Bristol.**—November 12th. Port of Bristol Authority. Installation of telephone and electric hooter signalling systems on the Eastern Arm Extension of the Royal Edward Dock.

**Dover.**—November 12th. Electricity Department. 2,500 yd. e.h.p. cable, 2,200-V switchgear. (November 2nd.)

**Dublin.**—November 12th. Dublin United Tramways Co., Ltd. General stores (including cables, lamps, electrical fittings, &c.), for 12 months. Forms of tender (2s. 6d.) from the company's offices, 59, Upper O'Connell Street, Dublin.

**Edinburgh.**—November 19th. Electricity Supply Department. One 1,000-kW motor convertor. (November 2nd.)

**Egypt.**—Cairo.—Egyptian State Railways. Electrification and equipment of the Cairo-Helonan line (approx. 20 miles).

**Farnworth.**—November 16th. Electricity Department. L.p. cables. (November 2nd.)

**Glasgow.**—November 13th. Corporation. Lanterns for electric street lighting. Specifications from Inspector, 20, Trongate.

**India.**—November 15th. Indian Stores Department. Motor alternator set and testing transformer for Government Test House, Calcutta. (B.X. 4790.)*

**Leeds.**—November 16th. Board of Guardians. Electric lamps required during period ending March 31st, 1929. Specification from Mr. J. H. Ford, clerk to Board of Guardians, Poor Law Offices, 11, South Parade, Leeds.

**London.**—Central Electricity Board.—January 4th, 1929. 132,000-V transformers in connection with the South-East England Electricity Scheme, 1927. (November 2nd.)

November 30th. 33,000-V transformers. (See this issue.)

Woolwich.—November 19th. Board of Guardians. Electric cooking apparatus. (See this issue.)

**Lourenco Marques.**—November 24th. Posts and Telegraphs Department. Materials, including g.i., copper and bronze wire, insulators, galvanometers, telephones, batteries, &c. (C. 2904.)*

**Manchester.**—November 13th. Tramways Committee. Trolley wire (electrolytic and cadmium copper); tramway poles (steel); tramway pole sleeves. Specifications from the secretary, Corporation Tramways, 55, Piccadilly, Manchester.

**New Zealand.** — Wellington. — February 12th. Public Works Department. 110-kV switchgear and controlling equipment for Waitaki electric power scheme. (B.X. 4848.)*

**Preston.** — December 12th. Electricity Committee. 60,000 tons of fuel for Ribble power station, Penwortham, during 12 months ending December 31st, 1929. Specification from Mr. J. F. Simpson, borough electrical engineer.

**South Africa.**—Johannesburg.—December 13th. Department of Posts and Telegraphs. Solder, copper wire and cable. (B.X. 4799.)*

December 20th. Telegraph materials. (C. 2900.)*

South African Railways and Harbours. December 13th. One 7-ton electrical overhead travelling crane. (A.X. 6989.)*

December 13th. One electrically-driven geared maximum service double planing machine. (A.X. 7064.)*

December 6th. Five 4-wheeled electrically driven traversers and one 5-ton hand-operated overhead travelling crane. (A.X. 7023.)* One 5-ton Diesel-electric caterpillar crane. (A.X. 7015.)*

Cape Town.—November 15th. Electricity Department. Cables. (B.X. 4852.)*

**Stoke-on-Trent.**—December 5th. Electricity Department. One natural draught cooling tower. (November 2nd.)

**Turkey.**—Angora.—December 18th. Post, Telegraphs and Telephones Department. 50,000 metres of rubber-covered field-telephone wire. (B.X. 4849.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

## Contracts Closed.

**Barking Town.**—The Urban District Council has accepted the tender of Messrs. Davis, Lawrence & Co., Ltd., for electric lighting installations for the Council's housing schemes at Upney and Parsons Row at £1,391 and £226, respectively.

**Carlisle.**—Markets Committee. Accepted:—
Electric light installation at market (£166).—J. Telford.
Electricity Committee. Accepted:—
Three transformers (£375).—Brush Electrical Engineering Co., Ltd.

**Glasgow.**—Finance Committee. Accepted:—
Electric pendants for St. Andrew's Hall.—General Electric Co., Ltd.
Health Committee. Accepted:—
Electric goods lift at Mearnskirk Sanatorium (£313).—Andrew Hutchison, Ltd.
Tramways Committee. Recommended:—
Electrical equipments.—Metropolitan-Vickers Electrical Co., Ltd.
Electromagnets.—Metropolitan-Vickers Electrical Co., Ltd., and Electro-Mechanical Brake Co., Ltd.
Armature coils.—Manchester Armature Repair Co., Ltd.
Special trackwork.—Titan Trackwork Co., Ltd., and Edgar Allen & Co., Ltd.
Spare armatures for G.E. equipments.—General Electric Co., Ltd.
Cadmium trolley wire.—British Insulated Cables, Ltd.

For the supply of round trolley wire it was proposed that the lowest tender, £1,106, of Messrs. Felten & Guilleaume, Germany, per Messrs. W. F. Dennis & Co., London, be accepted, and this was agreed to by the Committee, an amendment for the acceptance of the tender (£1,263) of Messrs. Frederick Smith & Co., Salford, for British wire being rejected.

**Heston-Isleworth.**—Electricity Committee. Accepted:—
One 1,500-amp. feeder panel (£157), three 1,100-V truck cubicles (£922), l.p. a.c. switchgear (£1,364).—General Electric Co., Ltd.
Feeder pillars (£293), kiosk (£110).—W. T. Henley's Telegraph Works Co., Ltd.
Three 11,000-kVA transformers (£682), one 300-kVA ditto (£217), l.p. a.c. switchgear (£367).—Hewittic Electric Co., Ltd.

**Leicester.**—Tramways Committee. Accepted:—
Tram rails and fishplates (£2,205).—Dorman, Long & Co. Ltd.

**London.**—London County Council.—Education Committee. Accepted:—
Electrical work at School of Arts and Crafts, Hammersmith.—H. J. Cash & Co., Ltd.
Electrical installation at Ealdham Square School, Woolwich.

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|---|---|
| Woolwich Borough Council Electricity Department. (Accepted.) | £621 |
| A. Higginbotham & Sons | 630 |
| Anderson, Angell & Co. | 645 |
| A. Dean & Co., Ltd. | 656 |
| Burdette & Co., Ltd. | 725 |
| T. Clarke & Co., Ltd. | 730 |
| Fordham Electrical Engineering Co., Ltd. | 734 |
| Pinching & Walton | 811 |
| Eastern Armature Winding Co. | 889 |

Central Electricity Board. Accepted:—
South-East England Electricity Scheme, 1927. 132,000-V outdoor switchgear:—
For the Northern portion of the area.—A. Reyrolle and Co., Ltd.
Southern portion of the area.—English Electric Co., Ltd.
The value of the contracts placed amounts to more than £600,000. Further reference to these contracts is made in our Business pages to-day.

**Oldham.**—Electricity Committee. Accepted:—
L.p. cable.—Union Cable Co., Ltd.

**Peterborough.**—City Council. Accepted:—
Wiring for electricity 54 Council houses (£444).—P. S. Willis.

**Portsmouth.**—Electricity Committee. Accepted:—
2,425 yd. h.p. cable (£628).—Johnson & Phillips, Ltd.

**Tain.**—Town Council. Accepted:—
Underground and overhead mains, street lighting, &c. (£2,315).—Lawrie & Co.
Electric lighting installation for the Town Hall (£108).—Watson & Dundas.

# Forthcoming Events.

**Junior Institution of Engineers.**—Friday, November 9th. 39, Victoria Street, S.W. 7.30 p.m. Annual general meeting.

Friday, November 16th. "Some Applications of Time and Remote Control Switches." Mr. A. N. Croucher.

**Physical Society.**—Friday, November 9th. Imperial College of Science, South Kensington, S.W. 5 p.m. Ordinary meeting.

**Faraday Society.**—Friday, November 9th. Royal Institution, Albemarle Street, W. 3.30 p.m. Spiers Memorial Lecture. "Some Debatable Problems in Physics." Sir Oliver Lodge, F.R.S.

**Association of Mining Electrical Engineers (South Wales Branch).**—Saturday, November 10th. South Wales Institute of Engineers, Cardiff. 6 p.m. "Modern Methods of Firing Steam Boilers" with special reference to pulverised fuel. Mr. S. B. Haslam.

**Royal Society of Arts.**—Monday, November 12th. John Street, Adelphi, W.C. 8 p.m. Cantor Lecture. "Refrigeration." Dr. F. Kidd.

**Nottingham Society of Engineers.**—Monday, November 12th. Victoria Station Hotel. 7.30 p.m. "The Importance of Heat Accumulation in Industry." Mr. E. G. Phillips.

**Institution of Electrical Engineers.—Informal Meeting.**—Monday, November 12th. Institution, Savoy Place, W.C. 7 p.m. "Engineering Requirements of a Modern Office Building." Mr. J. Coxon.

**(Irish Centre, Dublin).** — Thursday, November 15th. Trinity College, Dublin. 7.45 p.m. Ordinary meeting.

**(North-Eastern Centre).**—Monday, November 12th. Armstrong College, Newcastle-on-Tyne. 7 p.m. "Automobile Ignition." Prof. S. P. Smith. (Joint meeting with the North-Eastern Students' section).

**(North-Midland Centre).**—Tuesday, November 13th. Hotel Metropole, Leeds. 7 p.m. "Overhead Electric Lines." Mr. W. B. Woodhouse.

**(North-Western Centre).** — Tuesday, November 13th. Engineers' Club, Manchester. 7 p.m. "The Electrification of the Pietermaritzburg-Glencoe Section of the South African Railways." Mr. F. Lydall.

**(London Students' Section).**—Friday, November 9th. Institution, Savoy Place, W.C. 6.15 p.m. "Loud Speakers." Mr. T. M. C. Lance.

**(Scottish Centre).** — Tuesday, November 13th. Royal Technical College, Glasgow. 7.30 p.m. Address by the chairman, Mr. D. S. Munro, on "Some Tendencies in Installation Work," and Electrical Research Association report on "A Critical Study of the Current Rating of Low-Pressure Ordinary-duty Fusible Cut-outs." Mr. P. D. Morgan.

**(South-Midland Centre).**—Monday, November 12th. University, Birmingham. 7 p.m. "Action of a Spark-gap." Dr. J. D. Morgan.

**(Western Centre).**—Monday, November 12th. South Wales Institute of Engineers, Cardiff. "Some Practical Considerations in the Design of Automatic Equipments for Heavy Traction Sub-stations." Mr. H. B. Poynder.

**(East-Midland Sub-Centre).**—Tuesday, November 13th. The College, Loughborough. 6.45 p.m. "Electricity Meters." Mr. S. H. Holden.

**Electrical Power Engineers' Association (London Local Technical Group).**—Tuesday, November 13th. Junior Institution of Engineers, 39, Victoria Street, S.W. 7.15 p.m. "Factors underlying the Relative Efficiency of a.c. and d.c. Distribution for Town and Urban Areas." Mr. H. Blades.

**Electrical Trades Benevolent Institution.**—Wednesday, November 14th. Trocadero Restaurant. 7.30 p.m. Annual Festival.

**Institution of Chemical Engineers.**—Wednesday, November 14th. Institution of Civil Engineers. 6.30 p.m. "Making Rubber Goods of Latex by Electro-deposition." Dr. Paul Klein.

**British Institute of Radiology.**—November 14th-17th. Barnes Hall, Royal Society of Medicine, and Central Hall, Westminster. Exhibition and meetings; dinner at the Trocadero Restaurant. November 16th, at 7.30 p.m.

**Institution of Mechanical Engineers.**—Friday, November 16th. Institution, Storey's Gate, S.W. 6 p.m. "Power Transmission by Belts: an Investigation of Fundamentals." Mr. H. W. Swift.

**British Electrical Development Association.** — Friday, November 16th. Royal Society of Arts, John Street, Adelphi, W.C. 7.30 p.m. "Modern Lighting Designs for Domestic and Business Interiors." Mr. H. T. Young.

# Notes.

### Report on Newport Undertakings.

A committee of the Newport (Mon.) Town Council recently called in Mr. J. Adamson, a chartered accountant, to investigate the town's administration and suggest means of improving it. His report has been presented and is reproduced in full by the *South Wales Argus* from which we gather the following information.

Mr. Adamson examined, *inter alia*, the affairs of the Electricity and Tramways Department and found what he considers to be an excess of staff and unsatisfactory supervision, and recommends that several officials should be dispensed with. He also criticises the general policy of the department with regard to extensions, and declares that there has been lack of foresight. Among other matters dealt with are the delay in ceasing to generate electricity at the Llanarth Street station and in bringing the East power station up-to-date; capital expenditure in excess of actual requirements, leading to heavy borrowings and capital charges; the cost of coal and handling methods; the purchasing and checking of stores, &c. A number of recommendations are made, among which are the following:—The Llanarth Street station should be closed as a generating station on December 31st, 1928, when a number of men would cease to be employed there; the borough electrical engineer (Mr. A. Nichols Moore) should make his headquarters at the East power station, thus dispensing with the services of one engineer; all labour should be transferred to a general labour section; time switches should be installed for public lighting to reduce the staff employed; the methods of costing mains and services should be revised; consumers' accounts should be rendered continuously instead of quarterly; the showroom should be self-contained and treated as a separate trading entity; the control of expenditure should be simplified and strengthened, &c. In some general comments Mr. Adamson says that Newport, with the plant available, could have a considerably greater output with little or no additional cost; that the Committee should carefully examine generating costs, &c., before contracts are entered into with large industrial consumers; and he also suggests the reduction of the lighting rate to 4d. per kWh. Dealing with the Tramways Department, he applies part of the foregoing criticisms and recommendations, and says that but for the large amount of capital invested in the tramways he would recommend the complete scrapping of the system and probably, also, a similar course with regard to the 'bus system.

Mr. Adamson's criticisms and recommendations are not confined to the departments mentioned; he deals similarly with all other branches of the Council's activities. His main suggestion is that a "general manager" should be appointed to control all the spending departments. The report has been generally approved by the Special Committee on Reorganisation which recommended its adoption at a special meeting of the Town Council on Tuesday. The appointment of a general manager, however, is considered to be a question to be settled when other recommendations have been carried into effect. At the meeting, after a long debate, the matter was referred back to the departments concerned for examination and report.

### Electrical Notes from Switzerland.

The Woman's Exhibition, the "Saffa," at Berne, is doing its best to point out to the housewives of the country the many and great advantages of electricity in the household. One section is set apart as "Halle d'Electricité," where practically every electrical device is on view and in demonstration. A new pattern foot-warmer has found much favour, particularly in the hospital. It consists of a fireproof china cylinder, easily washed and disinfected, the interior of which is filled with the heat accumulator. The cylinder is placed on a special stand, which carries the flexible lead to a suitable point. The loading is only 100 W.

The Swiss dairy farmers have once more been discussing the question of using electricity for milking and butter-making. For three consecutive weeks at Zurich samples of milk have daily been analysed with a view to deciding which samples were the more free from bacilli—those from a dairy where the cows were hand-milked, or the samples from where electric were employed. The tests have been conclusive, as the following statistics prove:—

| Hours after milking. | Hand-milking, bacilli per c.c. | Electric milking, bacilli per c.c. |
|---|---|---|
| 3 | 16,800 | 13,000 |
| 27 | 44,000 | 16,300 |
| 51 | 697,300 | 50,400 |

The saving of labour, too, is a big item, as one youth of 17 was quite capable of milking electrically 24 cows, and seeing to the scrupulous cleansing of the apparatus afterwards. The costs for a dairy electrical installation for from 20 to 30 cows was about 4,000 fr. for the installation, 6 fr. per annum for maintenance, the consumption being about 35 kWh.

It is claimed that an electrical machine which has been invented by Dr. H. Bordier will cure colds in the head. This curious little arrangement pinches the two sides of the nose, much in the same fashion as a pair of eyeglasses, and electrodes canalise the electric current in the nasal ducts until the patient is conscious of considerable warmth in the interior of the afflicted organ. As a rule, a single application suffices to cure the cold.

### New Plant at Ashford.

On November 2nd extensions at the Ashford (Kent) electricity works were officially inaugurated by Mrs. Hayward, wife of Mr F. Hayward, chairman of the Urban Council's Electricity Committee. The extensions, which include a new Diesel-generator set and auxiliaries, and also building extensions, were made at a cost of about £9,000, or £15 per kW of the power installed. The engine, a 900-h.p. solid-injection Diesel, 8-cylinder, 300 r.p.m., is claimed to be the largest of its type installed in this country. It was built by Messrs. Davey, Paxman & Co., Ltd., and is directly coupled to a 600-kW generator supplied by the English Electric Co., Ltd. At the ceremony Mr. Hayward said that the new set brought the plant up to a total horse-power of 2,700. At the end of the year they would be self-supporting. In the current year they were hoping to generate three million units, which, he thought, was considerably in excess of one or two neighbouring towns which had had installations for 20 or 25 years. There was not much doubt that next year they would want another engine. They were already in negotiation with the Kent Power Company, consequent upon the Government bulk supply scheme, and if the Government could supply them with current more cheaply than they could make it locally, they would be compelled to take the Government supply, but he thought their own supply would be the cheaper, and that they might be able to supply others. Mr. Wilson, engineer and manager, said the Department had laid about thirty miles of mains and connected up about fourteen hundred service cables. Mr. Edward Paxman presented to Mrs. Hayward, who is president of the local branch of the Electrical Association for Women, a silver cigarette case, and to Mrs. Wilson, the secretary, E.A.W. (local branch), a gold pencil.

### Factory Lighting Lecture.

On October 25th a lecture with practical demonstrations was given in the Town Hall, Motherwell, on "Better Factory, Workshop and General Lighting," by Mr. H. E. Hughes, of the Scottish Electric Lighting Service Bureau, under the direction of the British Electrical Development Association, in connection with the Factory Lighting Campaign. Ex-Bailie Alexander Anderson, M.I.E.E., occupied the chair, and the arrangements were in the hands of Mr. W. D. Brassington, A.M.I.E.E., burgh electrical engineer, Motherwell and Wishaw, who, from inquiries already received, thinks a good service has been done to the community.

### Appointments Vacant.

Showroom assistant (£156) for the Bath Corporation Electricity Department. Assistant foremen in the Stores Department (£219) of the Irish Free State Department of Posts and Telegraphs. Wireless engineer (£550+£24) for the Government of Trinidad. Draughtsman-designer for Credenda Conduits, Ltd. Three shift engineers (£575) for the Perak River Hydro-Electric Power Co., Ltd. Meter tester and repairer for the Bournemouth and Poole Electricity Supply Co., Ltd. (See our advertisement pages to-day.)

### Fire.

A short-circuit in an electric fan in the Light Department of Guy's Hospital caused a fire on November 4th, which destroyed all the electrical apparatus in the room. A patient, who was receiving electrical treatment, was removed to safety and the conflagration was subdued with the aid of sand.

### Royal Engineer Volunteers.

Lieut.-Col. C. B. Clay informs us that the annual dinner of the London Army Troops Companies Group, Royal Engineers, will be held on Friday, November 23rd, at the Café Monico. Application for tickets from past members of the Corps and also its predecessors, the Engineering Institutions Volunteer Corps; the Architects' Corps; the L.C.C. Corps, may be obtained from Mr. C. E. Campbell, 25, Newman Street, Oxford Street, W.1, or from any of the past officers.

### Institute of Wireless Technology.

A meeting of the Institute of Wireless Technology will take place on Wednesday, November 14th, at the Engineers' Club, Coventry Street, London, W., at 7 p.m., when a paper by Mr. B. H. J. Kynaston, entitled "A Radio Fog Signal Alarm for Ship Stations" will be delivered. A revised number of the syllabus is now obtainable from the Hon. Secretary, Mr. Harrie J. King, F.C.C.S., at 71, Kingsway, London, W.C.2.

### E.A.W. Activities.

A meeting in connection with the electric "Outlet" campaign of the Electrical Association for Women was held on October 23rd by the Manchester and District Branch of the Association. Mr. H. C. Lamb, city electrical engineer, Manchester, said that no subject was more worthy of attention than the one under consideration by the meeting.

On October 23rd a large party of members of the Association visited the London Wholesale Dairies, Ltd., Vauxhall, by kind invitation of Mr. J. S. Latham.

The inaugural meeting of the Hampshire Branch of the Association was held at Southampton on October 29th; the chair was taken by the Dowager Lady Swaythling.

On October 30th a successful evening meeting was held at the E.L.M.A. Lighting Service Bureau, London, Strand, when Miss Gladys Burlton spoke in an entirely new way about "Salesmanship."

A meeting of the South Wales and Mon. Branch of the Association, in connection with the "Outlet Campaign," will be held on November 27th (6.30 p.m.) at the South Wales Institute of Engineers, Cardiff. Mrs. C. T. Allan, chairman of the branch, will preside.

### Manchester Meeting of Illuminating Engineering Society.

At the Manchester Lighting Service Bureau on October 29th, a meeting of the Illuminating Engineering Society was held. It was the first time a meeting of the Society had been held in Manchester, and it is hoped that the outcome will be the formation of a local branch. Mr. P. P. Wheelwright, of Blackburn, presided, and before a fairly large and keenly interested audience, Mr. J. L. H. Cooper, of E.L.M.A., read a paper on "Electric Lighting in the Engineering Industry." Mr. Cooper, it will be recollected, carried out an extensive investigation, covering a period of several months, in a large industrial area, and his paper, which was delivered in London for the first time at the end of last year, contains many valuable data on the conditions existing in machine, erecting, and assembly shops. In the discussion which followed, several speakers emphasised the difficulty of overcoming the conservatism of both the employer and the employé, in getting modern lighting installed. Mr. R. C. Hawkins, the District Officer, said that at one mill he was informed that the owners had installed B.E.S.A. dispersive reflectors, but they were immediately pulled down by the operatives, on the ground that they were too far from the machines. The possibilities of artificial daylight were also discussed, and it was generally agreed that "daylight" lamps had a big future in supplementing natural daylight in dark corners of factories. Mr. W. Barratt, of Rochdale, mentioned a mill at Bacup where "daylight" lamps had been tried, and had proved so successful that they were now used exclusively.

Presiding on Wednesday last week at a special meeting of the Society in Newcastle-on-Tyne, Sir Charles Parsons said that the first large installation of incandescent lighting in the world was at the Newcastle Exhibition 42 years ago. The paper by Mr. J. L. H. Cooper was read and led to an interesting debate, in the course of which Professor Thornton said that proper lighting of the home and factory meant a good deal to the general health of the community.

### London University Lectures.

A course of five public lectures on "High-voltage Cables" will be given at University College, London (Gower Street), by Mr. Percy Dunsheath, O.B.E., on Tuesdays commencing November 13th, at 6.30 p.m. At the first lecture the chair will be taken by Mr. Roger T. Smith, Fellow of the College. The lectures will be open to the public without fee or ticket.

### Reunion of Ex-National Telephone Co. Officials.

An opportunity is being afforded for past members of the Ex-National Telephone Co.'s staff to meet together on Monday, December 10th, at 7 p.m., at the New Criterion Restaurant, Piccadilly Circus. The chairman of the Arrangements Committee is Lieut.-Col. C. B. Clay, V.D., Hurst, Sundridge Avenue, Bromley, Kent, and the hon. secretary is Mr. T. A. Prout, 17, The Chine, N.21, who will be pleased to supply further information and to receive applications for tickets. Lieut.-Col. Clay will be in the chair, and all members of the Ex-National Telephone Co. are very cordially invited to attend.

### Railway Electrification.

The report of the Railway Electrification Committee (1927) has been published, and copies (price 6s. 6d.) can be obtained from H.M. Stationery Office, Adastral House, Kingsway, W.C.2, or through any bookseller. The Committee was appointed by the Minister of Transport in November, 1927, with the following terms of reference: "To review the recommendations made by the Electrification of Railways Advisory Committee, 1921, and to report what modifications, if any, should be made in these recommendations, having regard to the developments which have taken place since that date."

### Sequel to Explosion at the Johannesburg Power Station.

The *Cape Argus* reports that the Municipality of Johannesburg is to be sued for £20,000 in connection with the deaths of Richard Glencoe Urwin and J. W. Cleaves following an explosion at its power station, President Street, on May 7th, 1928. Summonses have been issued on behalf of Mrs. Urwin and Mrs. Cleaves. Each plaintiff claims £10,000 on grounds of alleged negligence, these being set out as follows:—(*a*) Failure to render the consumers' switch cubicles vermin proof, whereby a mouse was enabled to enter a certain cubicle and cause a fault in the circuit, resulting in a flow of current with which defendants' switches were unable to deal; (*b*) failure to provide efficient switchgear of rupturing capacity for the current dealt with; and (*c*) failure to take reasonable steps to render the existing switchgear safe for persons employed about it by the provision of thicker steel tanks and simpler operating mechanism, and by removing the automatic operating feature from the switches while employés were at work.

### British Institute of Radiology.

It has been decided by the Council of the British Institute of Radiology incorporated with the Röntgen Society to hold a special meeting at the opening of the new session on lines similar to those of last year, when the inaugural meeting of

this body was celebrated. On the present occasion, in addition to the address by Dr. G. W. C. Kaye, the president for 1928-29, papers have been promised by Prof. W. L. Bragg, Sir Thomas Horder, Bart., Mr. W. Sampson Handley, F.R.C.S., Mr. A. T. Walton, F.R.C.S., Prof. G. Shearer, and other distinguished workers in the radiological world. Most of the meetings will be held at the Central Hall, Westminster, November 14th to 17th, and at the same time there will be shown examples of the most modern X-Ray and allied apparatus, including exhibits by all British firms engaged in this industry, the development of which in this country is making rapid strides.

The proceedings are not open to the general public, but any person who is practically interested in radiological work is invited to attend. The director of the Institute, Dr. J. Muir, 32, Welbeck Street, London, W.1, will be pleased to give any information desired. Travelling facilities at reduced fares have been arranged with the railway companies.

### The New Coventry Electricity Works.

As mentioned in the description elsewhere in this issue, the new power station erected and equipped by the British Thomson-Houston Co., Ltd., for the Coventry Corporation at Longford, was opened on October 31st by the Mayor of Coventry, Ald. Fred Lee, J.P. His Worship, in a preliminary address, said that Coventry's first station was opened at Sandy Lane in 1895, consisting of two rope-driven sets, with a capacity of 150 kW. In the first year the total number of units sold was 51,114 to 72 consumers. Last year the undertaking had a generating capacity of 30,000 kW, and sold 70,215,652 kWh to 18,803 consumers. The cost per unit the first year was 3.85d., and that figure had been brought down to .88d. The charges to consumers in the same time had been reduced from 5.85d. to 1.05d. per unit. The total revenue for 1896 was £1,246, and for last year £309,080. The losses of the early years had been turned into a profit of £51,900, and £89,350 had been contributed towards the rates of the city. At luncheon, after the ceremony, Mr. S. T. Allen, Central England Engineer of the Central Electricity Board, proposing the toast of "The City of Coventry and its Electricity Undertaking," complimented the city upon the sound progressive business methods of the Electricity Department, and pointed out that only four of the 233 municipal undertakings in the country had a lower working cost, three a lower average charge per unit, and four a higher output per head of the population. He acknowledged that his work on the Central Electricity Board and the work of the scheme would be made more stable by the kindly spirit and businesslike support shown by Coventry. The Mayor, in reply, said that the two stations of Birmingham and Coventry would help each other in the development of the Central England scheme. Col. C. V. Holbrook, president of the Coventry Chamber of Commerce, said by undertakings like that at Coventry corporations could help to relieve the burdens upon industry. Councillor Payne, in proposing "The Contractors and Sub-Contractors," acknowledged the excellence of their work and the prompt manner in which it had been carried out. Mr. H. C. Levis, chairman of the B.T.-H. Co., responded, and presented the Mayor with a gold cigarette case, Councillor Payne with a gold watch, and Mr. G. Tough with a silver cigar box as mementoes of the occasion.

### Hydro-Electric Development in New Zealand.

At the sixth annual conference of the New Zealand Electric Power Boards held recently in Wellington, the Prime Minister (the Hon. J. G. Coates) gave some statistics showing the development of hydro-electric schemes in the Dominion. The following figures quoted with the various schemes represent, respectively, the plant capacities of the schemes in h.p. and the total costs:—Coleridge, 36,000, £1,561,081; Hora Hora, 13,000, £973,173; Mangahao, 25,600, £2,373,921; Waikaremoana, 42,000, £613,893; Arapuni, 60,000, £1,968,618. The last two schemes are still under construction. In the year 1920-21 the Government had 382 miles of transmission and distribution lines which had increased in 1927 to 1,261 miles, while other authorities in 1920-21 had 2,292 miles, and in 1927 13,714 miles. The peak loads of all the stations in 1920 totalled 30,716 kW and in 1927 106,281 kW. The Government scheme in hand provided for the completion and interconnection of power stations in the North Island at Mangahao, Waikaremoana, and Arapuni. Mangahao was now complete with 25,600 h.p.; Arapuni, with a first stage of 60,000 h.p., would be in operation in the winter of 1929, and an ultimate capacity of 160,000 h.p. would be provided by adding 20,000-h.p. units as required, probably at the rate of one every two years. Waikaremoana, with its first installation of 40,000 h.p., should commence operation in the autumn of 1929, and could be increased to an ultimate capacity of 130,000 h.p. as required. The main transmission lines would be extended as the guaranteed load in sight became sufficient to pay the capital charges on the extra capital involved. The indications were that extensions would be warranted at an early date to Taranaki and to North Auckland. For the South Island the general scheme provided for increasing the capacity of the Coleridge plant to 46,000 h.p.; this extension was now in hand. Provision was also made for a new station on the Waitaki, near Kurow, with an initial capacity of 40,000 h.p., and this work had been recently started. This would be in intercommunication with Coleridge, and later with Waipori (Otago) and Monowai (Southland). Schemes had been surveyed for the supply of Nelson, Marlborough, and Buller, which could be commenced when the load in sight was sufficient to warrant the capital expenditure.

# Institution Notes.

### Institution of Electrical Engineers.

INFORMAL MEETING.—At the informal meeting on October 29th the president, Lieut.-Col. K. Edgcumbe, opened the session with a discussion on "Our Profession from a Manufacturer's Point of View." In true informal manner he upheld and amplified some of the opinions he had expressed in his presidential address a few days earlier, but the discussion was mainly round the view that the home industries must speedily become active and prosperous or the country would go deeper still into distress.

Mr. A. Morgan said that in some manufacturing processes 90 per cent. of the operation consists of transporting the articles from one process to another. By scientific appliances it was often easy to save an hour a day in handling.

Mr. W. Day thought they ought not to condemn the politician until business men were able to foregather and issue a unanimous plan for improvement; much relief to industry could be effected by de-rating industrial areas.

Mr. H. Wilson pointed out that German reparations had partly destroyed our coal market, while in compelling Germany to disband her army and navy, we were relieving her of an enormous annual charge that other nations bore.

Mr. Ll. Atkinson dealt with the argument that every import created an export, and said that if this were so we had only to order some three hundred million pounds' worth of imports and all our troubles would be over. He agreed that imports were paid for by goods, or services, but if we bought at home we made exactly the same exchange.

Messrs. W. F. Bishop, E. Cowan, W. A. Erlebach, C. C. Hawkins, D. B. Hoseason, A. N. D. Kerr, W. Lang, H. J. Neill, G. S. Payne, D. A. Stewart, and H. Wilson also spoke.

# Our Personal Column.

**Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.**

Mr. E. JORDAN, borough electrical engineer at Harwich, has been appointed resident electrical engineer to the West Wilts. Power Company.

Press reports from Melbourne state that Mr. E. H. SHACKELL has been appointed managing director of the Electrolytic Zinc Company of Australasia.

Mr. G. R. CLARK, late of the B.T.-H. Co., Ltd., and Messrs. G. P. Dennis, Ltd., of Liverpool, has joined the outside staff of the Hotpoint Electric Appliance Co., Ltd., 99, Corporation Street, Manchester.

Glasgow Corporation Special Committee on Wages, &c., has approved the appointment of Mr. JOHN SIMPSON as secretary and treasurer of the Electricity Department at a salary of £750 per annum.

Mr. F. G. G. A. MARRAINE, M.A.(Cantab.) has been appointed to the post of lecturer and demonstrator to Faraday House Electrical Engineering College, London.

Mr. H. A. CHARD, sole agent for the Eastern and Western Counties for Electric Art Shades (1928), Ltd., of Witham, who has been in ill-health, but is shortly resuming his duties, asks for his correspondence to be addressed to him at The Old Vicarage, Stowmarket.

Mr. JAMES WITTER, superintendent of installations in the Liverpool Corporation Electric Supply Department, retired last week after 44 years' service with the Liverpool Electric Supply Co., Ltd., and the Liverpool Corporation. To mark his retirement, Mr. P. J. Robinson, the city electrical engineer, made a presentation on behalf of the staff.

This session's chairman of the Wireless Section of the Institution of Electrical Engineers is Commander J. A. SLEE, C.B.E., R.N. (retired), who has recently been appointed assistant general manager of the Marconi International Marine Communication Co., Ltd. Commander Slee's early training was obtained on the training ship *Britannia*. Then, after

a term of service as a lieutenant, he qualified as torpedo lieutenant, and spent a year on the staff of the *Defiance* at Devonport, where he first took up the study of wireless in 1901. For the two years following 1906, when he left the sea for naval services ashore, he was one of the wireless tele-

**Commander J. A. Slee, C.B.E., R.N. (Ret.).**
The Chairman of the Wireless Section of the I.E.E.

graph experimental officers on the *Vernon* at Portsmouth, and from 1908 until 1919 was in charge of all shore wireless and war signal stations in Great Britain. On the formation of the Wireless Board, Commander Slee was appointed its chief, with the acting rank of captain. In 1919 he was awarded the C.B.E., and later he retired from the Navy with the rank of commander. He was then asked to place his experience of wireless at sea at the disposal of the Merchant Navy, and he accordingly joined the Marconi International Marine Communication Co., Ltd., as technical superintendent and advisor in January, 1920, later being appointed to the post of technical manager. Commander Slee has recently returned from representing his company at the International Wireless Telegraph Conference at Washington.

Mr. J. Scott, consulting electrical engineer, who was mayor-designate of Bootle, was defeated in the municipal elections last week. He contested the Stanley ward, as a Conservative, and polled 1,259 votes, or 119 votes fewer than the successful candidate. At Birkenhead, Mr. G. P. Dennis, electrical engineer, contested the Bebington ward as independent Conservative, and was defeated by the Labour candidate. One of the surprises at Preston was the defeat of Mr. E. A. Heaney, chairman of the Electricity Committee.

On the occasion of the lecture at the Lighting Service Bureau on October 31st, Mr. W. E. Bush, who was in the chair, was accorded a warm welcome after his recent visit to America.

Mr. Wm. Hamilton Attwooll, late of Holophane, Ltd., has been appointed branch manager at Glasgow for the Revo Electric Co., Ltd., Tipton.

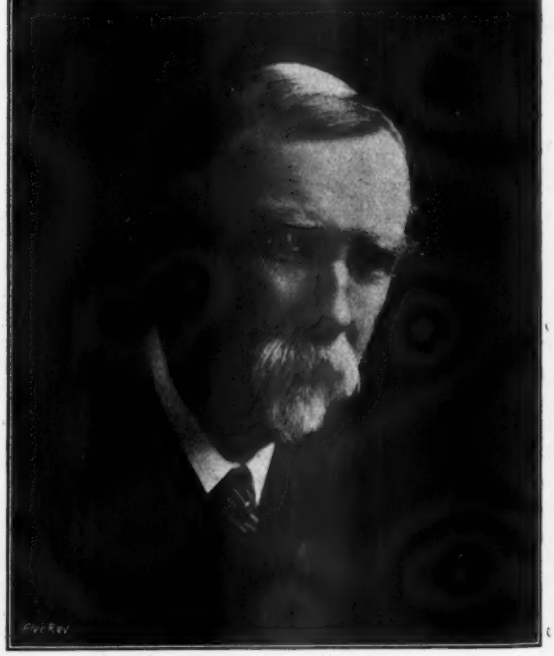
In March, 1920, the Hackney Borough Council, decided to adopt the A.M.E.E. scale for the remuneration of the borough electrical engineer (Mr. L. L. Robinson). The Establishment Committee now recommends the adoption of the "Walker" scale, plus 10 per cent. Up to 50 million kWh sold this would result in a reduction, but thereafter the suggested change would be to Mr. Robinson's advantage. Hackney's present sales are about 34 million kWh, but are said to be increasing rapidly.

Mr. F. W. Prosser, sales manager and secretary of the Bristol Corporation Electricity Department, is to retire after nearly 48 years' service, on a superannuation allowance of £326 per annum.

**Obituary.**—Ald. J. R. Horrocks.—At the interment of Ald. J. R. Horrocks, chairman of Bolton Tramways Committee, on November 2nd, nearly 200 tramwaymen formed a guard of honour to the church porch, and the coffin was carried by eight drivers from the Tramways Department. Representatives of tramway undertakings from all over the country and civic leaders from all parts of Lancashire attended.

Mr. C. J. Jewell.—We regret to learn that Mr. Charles J. Jewell, M.I.E.E., general manager of the Norwich Electric Tramway Co., passed away on November 2nd, at the age of 56 years.

Sir A. B. W. Kennedy.—We regret to record the death of Sir Alexander Blackie William Kennedy, LL.D., F.R.S., &c., which occurred at The Albany, Piccadilly, London, on November 1st, aged 81 years. Sir Alexander was born in 1847 at Stepney, the eldest son of the Rev. John Kennedy, D.D., and of a sister of Prof. John Stuart Blackie, of Edinburgh. He served as a pupil with a Millwall engineering and shipbuilding firm, and subsequently, after service with other well-known works, spent three years in consulting engineering practice in Scotland. From 1874 to 1889 he was Professor of Engineering at University College, London, and from the latter year onwards he has been engaged in private consulting practice latterly as head of the well-known firm, Kennedy and Donkin, London, of which one of his sons is a member. He was very early associated with electricity supply matters in London and in different parts of the Kingdom; indeed he is rightly described as a pioneer in this branch of activity, for he was engineer of the Westminster Electric Supply Corporation from its foundation in 1889, and was connected also with the St. James' and Pall Mall and the Central Electric Supply Companies. Edinburgh, Glasgow, and many other cities and towns have electricity undertakings for which he acted as consulting engineer, while in the traction department of the industry he acted as consulting engineer to several leading railway companies, as electrical engineer to the Waterloo and City Railway, and as electrical adviser to the London County Council in connection with early stages of its tramway undertaking. During the past 30 or 40 years he had held the presidency of the Institutions of Civil and Mechanical Engineers, and of the Engineering Section of the British Association, had filled the chairmanship of the Advisory Committee on Electric Railways under the Ministry of Transport in 1920, had presided over the Admiralty Machinery Designs Committee, served on Lord Parker's Committee on Wireless Telegraphy in 1913, rendered special service in various matters during the war, while in his later years he had taken a very keen and practical interest in exploration. It is impossible in so brief a notice to presume to do justice to so lengthy and so full a career of eminence, for a mere outline of the engineering and other concerns with which he was associated would



*Elliott & Fry* [*London.*
**The late Sir A. B. W. Kennedy.**

fill a good-sized volume. Sir Alexander received his knighthood in the year 1905, and he was elected a Fellow of the Royal Society in 1887.

Mr. P. H. Cossar.—We regret to learn that Mr. Peter H. Cossar, electrical contractor, died suddenly in Glasgow on October 29th. Mr. Cossar was for many years engaged in the contracting trade in Glasgow, and at the time of his death he was chairman of the Glasgow Branch of the Electrical Contractors' Association of Scotland.

# Financial Section.

**New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.**

## New Companies Registered.

**Slough Radio Co., Ltd.**—Private company. Registered October 29th. Capital, £500 in £1 shares. Objects: To acquire the business of makers of radio sets and spare parts carried on by W. P. C. Welch, at 22, High Street, Slough. The directors are:—I. Day, 76, Park Street, Slough, printer; J. C. House, Deerbrook, Ashford, Middlesex; E. L. Reynolds, 11, Mackenzie Street, Slough, solicitor; W. P. C. Welch, Timbertown, Farnham Royal, Bucks., electrician. Secretary: W. P. C. Welch.

**Foodstuffs Irradiation Co., Ltd.**—Registered as a private company, October 27th. Capital: £250 in 1s. shares (1,250 "A" and 3,750 "B"). Objects: To manufacture, buy, sell and exchange all kinds of scientific and electrical apparatus and machinery, and especially that used in connection with the irradiation and sterilisation of foodstuffs, and to enter into an agreement with A. Barclay and E. O. Scheidt for the acquisition of patent No. 257,956, and also the benefit of an agreement between the said persons. The first directors are:—A. Barclay (managing director and chairman); E. A. Macmillan and E. O. Scheidt, addresses not stated. Secretary: C. S. Denham. Registered office: 15, Caroline Street, Bedford Square, W.C.1.

**A.R.L. Syndicate, Ltd.**—Private company. Registered October 26th. Capital, £3,000 in £1 shares. Objects: To adopt an agreement between A. D. de Castro and the Central Trust Co., Ltd. (for this company) to develop and turn to account patents for improvements to electric lamps, owned by the said A. D. de Castro, and to carry on the business of electricians, electrical and mechanical engineers, manufacturers of, agents for or vendors of all kinds of electric and other lamps, and electrical and radio apparatus, &c. The first directors are:—A. D. de Castro, 55, West 88th Street, New York City, U.S.A., scientist; H. J. Drane, Friars, Fordham, Colchester, publisher; T. L. Holland, 42, The Green, Kew (chairman); W. F. White, 15, Whittingstall Road, S.W.6, accountant. Secretary: J. E. Albrow. Registered office: 5, Broad Street Place, E.C.

**Arthur E. Cook, Ltd.**—Private company. Registered October 27th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers and manufacturers, &c. The subscribers (each with one share) are:—A. E. Cook, Mrs. E. L. Cook, and H. A. Cook, all of 7, Greenside Road, West Croydon. A. E. Cook is permanent governing director. Registered office: National Deposit Buildings, Station Road, West Croydon.

**Atomic Electrical Displacement Co., Ltd.**—Private company. Registered October 25th. Capital, £100 in 1s. shares. Objects: To carry on the business of metallurgists, electricians, mechanical engineers, manufacturers and workers of and dealers in electricity, motive power and light, batteries, accumulators, &c. The subscribers (each with one share) are:—W. S. Parkes, 13, Staines Road, Ilford, traveller; T. J. Hearn and S. F. A. Hearn, "Breydon," Wytecliffe Road, Purley, accountants. Registered office: 20, Kingsley House, 77, Lower Thames Street, E.C.3.

**Morecambe Electrical Equipment Co., Ltd.**—Private company. Registered October 27th. Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturing electrical engineers, electricians, mechanical engineers, &c. The directors are:—F. C. Fahy, 11, Morecambe Terrace, Morecambe and Heysham; J. W. Parkinson, "Luneville," Albert Road, Morecambe and Heysham. Registered office: Fahy's Garage, Euston Road, Morecambe and Heysham.

**Utilities Corporation (Poland), Ltd.**—Registered as a public company October 27th. Capital: £400,000 in £1 shares. Objects: To seek for and secure openings for the employment of capital in Poland and elsewhere, to purchase, underwrite, subscribe for or acquire, hold and deal in investments and securities of all kinds, to carry on, promote, or participate in trading, financial, electrical, mining, and other businesses, and to carry on the business of exporters and importers, general engineers and contractors, &c. The subscribers (each with one share) are:—V. Summers and E. Rudland, 2, Bond Court, Walbrook, E.C., clerks. Registered office: 33, Gracechurch Street, Lombard Court, E.C.3.

**Mayfair Electric Gramophones, Ltd.**—Public company. Registered November 2nd. Capital: £150,000 in 2s. shares. Objects: To adopt an agreement with Radi-Arc Electrical Company (1927), Ltd., H. Erdman and H. Hardy (principal agreement), and to acquire the whole of the undertaking of the said company except its uncalled capital, and to carry on the business of manufacturers of and dealers in gramophones or phonograph machines, records, apparatus and equipment, musical instruments and electrical, telegraphic, telephonic, wireless, and other apparatus and equipment, &c. The subscribers (each with one share) are:—R. O. Taylor, 15, Oakington Avenue, Wembley, solicitor; D. S. Woolf, 20, Christchurch Avenue, N.W.6, and five others. Solicitors: Cohn Seligman & Bax, 52, New Broad Street, E.C.2.

**Universal Gramophone and Radio Co., Ltd.**—Public company. Registered November 2nd. Capital: £300,000 in 5s. shares. Objects: To adopt an agreement with the Dominion Finance Company, Ltd., and to carry on the business of manufacturers of and dealers in gramophone records, gramophones, musical instruments of all kinds, television, electrical and wireless apparatus, &c. The subscribers (each with one share) are:—W. H. Walford, 10, Lambourne Road, Leytonstone, E.11, clerk; H. W. Brown, 63, Effingham Road, Lee, S.E.12, clerk; and five other clerks. Solicitors: Ashurst, Morris, Crisp & Co., 17, Throgmorton Avenue, E.C.2.

**Sumit (London), Ltd.**—Private company. Registered November 2nd. Capital, £1,000 in £1 shares. Objects: To carry on business as engineers, advisers, consultants and contractors in connection with wireless, &c. The first directors are:—Mrs. I. V. Summers, 7b, Grange Park, Ealing; R. de Roy, 92, Wembley Park Drive, Wembley, electrical engineer. Solicitors: H. M. Meyler & Co., 8, Churton Street, S.W.1.

**Commercial Radio Co., Ltd.**—Private company. Registered November 1st. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical and radio engineers as formerly carried on by E. Davidson, at 47, Rathbone Place, Oxford Street, W. The first directors are: E. Davidson, 538, Commercial Road, Stepney, E.1, electrical and radio engineer; R. Davison, 117, Belgrave Street, Stepney, E.1, engineer. Secretary: L. Goodman, 19, Busby Street, Bethnal Green. Registered office: 47, Rathbone Place, Oxford Street, W.1.

**Clifford & Snell, Ltd.**—Private company. Registered November 1st. Capital, £1,000 in £1 shares. Objects: To adopt an agreement with F. S. Clifford and A. E. C. Snell, and to carry on the business of manufacturers of and dealers in radio apparatus and accessories, photographic apparatus and parts, electricians, electrical engineers, &c. The permanent directors are: F. S. Clifford (managing director), "Rhydlanfiar," Merstham, Surrey; A. E. C. Snell (technical director), 28, Bourne Avenue, Hillingdon, Middlesex. Registered office: 63, Sumner Road, West Croydon, Surrey.

**Gripsok, Ltd.**—Private company. Registered October 31st. Capital, £2,000 in £1 shares. Objects: To adopt an agreement with D. Robinson for the purchase of the trade mark "Gripsok" in respect of goods relating to electrical terminals of ordinary metal, and also for the purchase of certain patents granted to him for an invention relating to electrical terminals and any subsequent improvements which may be effected by the said D. Robinson, and to carry on the business of electrical and mechanical engineers, manufacturers and workers of and dealers in electricity and radio-telegraphy and telephony, &c. The subscribers are: Mrs. E. L. Graham, Gordon House, Weymouth; J. R. George, 79, St. Thomas Street, Weymouth, confectioner. Solicitors: Andrews, Barrett & Wilkinson, 69, St. Thomas Street, Weymouth.

**Electro Universal Motor Equipment Co., Ltd.**—Private company. Registered October 31st. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical, wireless, mechanical and general engineers, engineering contractors, consulting wireless experts, &c. The directors are: B. J. Hughes (permanent managing director), 25, Fendale Avenue, East Boldon, Co. Durham; W. E. King, 28, Makepeace Avenue, Hillway, N.6.

**Automa Appliances, Ltd.**—Private company. Registered October 30th. Capital, £100 in 1s. shares. Objects: To carry on the business of manufacturing electrical and mechanical engineers, manufacturers and hirers of and dealers in automatic coin and slot machines, &c. The subscribers (each with one share) are: A. J. Cameron, 27, Wensleydale Road, Hampton, Middlesex, and H. R. Hodgson, 2a, Trevanion Road, West Kensington, W.14, company directors. Secretary: A. J. Cameron. Registered office: 74a, Regent Street, W.1.

# Official Returns of Electrical Companies.

**English Electric Co., Ltd.**—Mortgage dated October 23rd, 1928 (supplemental to trust deed dated August 14th, 1923, securing £1,600,000 6 per cent. convertible debenture stock) charged on properties, &c., at Hough and Castle Church, Staffs, and Coventry. Trustees: Anglo-American Debenture Corporation, Ltd., 320, Gresham House, E.C. Also mortgage dated October 23rd, 1928 (supplemental to charge dated September 15th, 1924, securing all moneys due or to become due from the company to Lloyd's Bank, Ltd., and to the Bank of Liverpool & Martins, Ltd., not exceeding £500,000), charged on above property, &c.

**Midland Electric Lamp Co., Ltd.**—H. Harris, 17, Brazennose Street, Manchester, ceased to act as receiver on October 26th, 1928.

**Bretwood, Ltd.** (formerly Radio Improvements, Ltd.).—E. J. Bell, 17, Queen Victoria Street, E.C.4, was appointed receiver on October 18th, 1928, under powers contained in debentures dated September 15th, 1927.

**Welco Patents, Ltd.**—E. Greenhill, 13, Bennetts Hill, Birmingham, ceased to act as receiver or manager on October 24th, 1928.

**Harris, Williams (Manufacturers), Ltd.**—Debenture dated October 10th, 1928, to secure £5,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holders:—H. S. Sutherland, "Chislehurst," Carmel Road, Darlington; and T. Hall, 37, Groat Market, Newcastle-upon-Tyne.

**Ultra Electric, Ltd.**—Capital, £5,000 in £1 shares. Return dated July 20th, 1928. All shares taken up. £3,000 paid, £2,000 considered as paid. Mortgages and charges, nil.

**Century Electric Co., Ltd.**—Capital, £5,000 in £1 shares. Return dated October 20th, 1928. 2,387 shares taken up. £2,387 paid. Mortgages and charges, nil.

**Pettigrew & Merriman (1925), Ltd.**—Capital, £250,000 in 125,000 preference of £1 each and 500,000 ordinary shares of 5s. each. Return dated June 14th, 1928. 125,000 preference and 435,600 ordinary shares taken up. £202,650 paid (being 15s. per share on the preference and 5s. per share on the ordinary). Mortgages and charges, nil.

**Neron Lamps, Ltd.**—Capital, £5,000 in £1 shares. Return dated March 20th, 1928. All shares taken up. £5,000 paid. Mortgages and charges, nil.

**Impex Electrical, Ltd.**—Capital, £2,000 in £1 shares. Return dated July 31st, 1928. 500 shares taken up. £500 paid. Mortgages and charges, nil.

# City Notes.

### Drake & Gorham, Ltd.

Mr. B. M. Drake (chairman), presiding at the annual meeting on October 30th, said that in the year under review they had maintained their policy of working at a small percentage of profit. When the company started in 1901 it never occurred to people to entrust the work to other than experts. Now that the superiority of electric light was universally admitted, their concern was to educate the public as to the risks incurred in accepting the lowest price regardless of the competence of the contractor or the quality of materials used. This country was making a bold experiment in standardising for a.c. supply a voltage twice as great as other nations had considered safe to adopt; a.c. was much more dangerous than d.c. at the same voltage. Unless, therefore, skilled workmen under qualified supervision were employed, and special safeguards were adopted, fatalities would increase. With proper precautions and systematic testing, safety from shock and fire could be ensured. He would have preferred to see the use of a.c. limited to the transmission of power from the superstations to the town, the final distribution to the consumer being d.c., which permitted of the use of storage batteries. To provide quick attendance they had established a network of local offices and travelling inspectors with cars. Amongst recent contracts which they had secured were many for well-known people and large institutions. Many leading architects and consulting engineers had given them contracts. The turnover in London work had doubled. One section of the new Bank of England had been handed over to the Bank authorities, with entirely satisfactory results; at the present rate of progress the contract would take many years to complete. Lloyds Bank new head offices would require 2,363 lights, 59 heating, and 300 vacuum cleaner points—a total of 1,300-kW connected load—including provision for heating, lifts, and pumps, and there were several other jobs of considerable size in hand. As a result of the special experience which the company's engineering staff possessed, further orders had been obtained for the wiring of artificial silk factories. Many large electrically-operated signs had been put to work in the North under the sole district agency for one of the leading manufacturers. The reception of the company's "Metesco" switch-fuses for 6,600 and 12,500 V was most gratifying. These, as well as standard sub-station h.p. switchgear, had been supplied to the Metropolitan, Chelsea, North Metropolitan, Edmundson's, and Twickenham and Teddington companies, and also the municipal electricity departments of Luton, Basingstoke, Edinburgh, Kettering, and Hereford. The main distribution switchboard which they had in hand for Lloyds Bank would be 30 ft. long, whilst that for the Bank of England measured 90 ft. Satisfactory progress had been made in the sale of pumping gear, water softeners, &c. The report and accounts were adopted.

### Brook Motors, Ltd.

The following dividends have been declared for the year ended September 30th last: 7½ per cent. on the preference shares; and 12½ per cent. on the ordinary shares. The company states that the employés have been encouraged to take up 7½ per cent. preference shares, and 78 per cent. of them have done so. The scheme provides for payment for the shares to be made by deductions from weekly wages. "With each complete number of five preference shares, each of which costs £1, dividends on one ordinary share will be allowed, thus purchasers of five preference shares will receive 7½ per cent. per annum, and, provided that the ordinary shares earn the same dividend as the average dividend earned since these works were established, it will be at the rate of 12½ per cent., and from this no tax would be deducted, therefore the percentage earned on each preference share would be about 10 per cent." The shares can only be sold to the company, which will purchase them at par. Employés leaving the company have to surrender their shares at their par value.

### Atlas Light and Power Co., Ltd.

The credit balance for the year ended March 31st last was £300,907, as compared with £275,591 in the preceding year. It is proposed to pay a final dividend of 3 per cent. on the ordinary shares, making 5 per cent. for the year (as in 1926-27). A balance of £35,756 is carried forward. During the year the company issued £530,000 of 6 per cent. debenture stock, a similar amount of preference shares, and £114,789 in ordinary shares. This represented the balance of the authorised capital, and subsequently approval was given to a capital increase of £1,000,000. Last year the company acquired the electricity and traction businesses in the city of Parana and a controlling interest in the Tucuman Tramways, Light & Power Co. Progress in Cordoba and Santa Fé is reported, but it is stated that omnibus competition adversely affected the Montevideo tramways.

### Beaver Trust, Ltd.

Addressing the annual meeting of the company on October 31st, the chairman (Mr. J. G. B. Stone) said that during the year 200,000 £1 shares had been created and issued, raising the company's capital to £300,000. The directors had also raised £150,000 by means of 5 per cent. debenture stock. Practically the whole of the proceeds had been profitably invested, and there was still £150,000 available for issue as and when required. The directors had in mind a further increase in the capital. A total dividend of 7½ per cent. for the year had been paid. It was proposed to sub-divide the capital into 5½ per cent. cumulative preference shares and ordinary shares in the proportions of 60 and 40 per cent. The report and accounts were adopted, and subsequently the proposed re-arrangement of the capital was approved.

### Prospectuses.

*Continuous Gramophones, Ltd.*—This company's registration was recorded in our last issue (p. 768). An issue of 550,000 shares of 5s. each at par was made last week. The prospectus gave the names of the directors as Messrs. G. A. Bryan, R. M. Cook, and A. J. Duhamel, M.C. The registered office is at 13, Queen Street, E.C.4. The company is acquiring patents for electrically-operated continuous gramophones which possess a number of novel and remarkable features.

*Mayfair Electric Gramophones, Ltd.*—This company, whose registration appears in our "New Companies" section to-day, made an issue of 950,000 ordinary shares of 2s. each at par this week. The prospectus gave the names of the directors as: Sir Logie Elphinstone, Bt. (chairman), and Messrs. L. S. G. Young, J. Halsby, H. C. Barder, and C. Law. The registered office is at 85, London Wall, E.C.2. It was stated that the "Mayfair" electric gramophone involves the scientific application of the valve amplification method of reproduction by means of an electromagnetic "pick-up."

### Coventry Chain Co., Ltd.

The profit for the year ended August 31st was £101,000, as compared with £47,600 in the preceding year. It is proposed to pay a final ordinary dividend of 7 per cent., making 10 per cent. for the year (against 7½ per cent), together with a bonus of 2½ per cent.

### Bolckow, Vaughan & Co., Ltd.

The gross profit for the past year rose from £261,778 to £297,103, and the net profit from £42,046 to £67,261. With the balance brought in (£42,046) this is carried forward. The dividend on the 5 per cent. preference shares remains in arrear from January 1st, 1924, while no ordinary dividend has been paid since 1920-21.

### Companies Struck Off the Register.

The names of the undermentioned companies have been struck off the Register, and tnese companies are thereby dissolved:—

Granville Electrical & Motor Co., Ltd.
Kelvin Manufacturing Co., Ltd.

### Erinoid, Ltd.

The net profit for the year ended August 31st was £21,268, against £17,068 in the preceding year. With the receipts from the French company and £6,992 brought forward, the balance available is £28,874. Of this £9,739 is transferred to reserves and £250 to the staff fund; a final dividend of 4 per cent. is recommended, making 7 per cent. for the year (as for 1926-27), and £5,184 is to be carried forward.

### British Electric Transformer Co., Ltd.

The profit for the half-year ended June 30th, 1928, amounted to £7,229, as compared with £17,143 for the corresponding period of last year. As foreshadowed in the chairman's speech at the last general meeting, unrestricted competition is having an adverse effect, but the factories are working full time.

### John I. Thornycroft & Co., Ltd.

The directors have declared a total dividend of 9 per cent. (against 7½ per cent.) upon the 7½ per cent. participating preferred ordinary shares and one of 15 per cent. upon the ordinary shares (against 6 per cent.).

### Reduction of Capital.

STILL ENGINE CO., LTD., AND REDUCED.—A petition has been presented to the High Court for the confirmation of the reduction of the capital of this company from £303,750 to £86,839, and will be heard in London on November 12th.

### Dutch Company.

The *Financial News* reports that the Dutch Cable Factory has made an issue of shares for 2,500,000 guilders to holders of existing shares at 140 (guilders) each.

### W. T. Henley's Telegraph Works Co., Ltd.

The directors have declared an interim dividend on the ordinary shares of 1s. 6d. per share, less tax, to be paid on December 1st. The same rate was paid last year.

### Dubilier Condenser Co. (1925), Ltd.

The half-yearly dividend has been declared on the 7½ per cent. cumulative preference shares.

### Simms Motor Units, Ltd.

An interim dividend of 5 per cent. has again been declared.

### French Companies.

The *Société des Accumulateurs Electriques* (*Dinin*) records net profits of 6,682,000 fr. for 1927-28. A dividend at the rate of 30 fr. gross per share has been declared.

The *Societe le Fil Dynamo* reports net profits for 1927-28 of 646,000 fr. The dividend on the A shares of 100 fr. is 30 fr. per share, and that on the B shares 21 fr.

### Italian Loan in New York.

It is reported that a loan is being arranged in New York by Messrs. Field Glore & Co. and Kelley Converse & Co. on behalf of the Ercole Marelli Co., of Italy.

# Stocks and Shares.

MONDAY EVENING.

STOCK Exchange markets are pausing to take breath after their violent excitement of the past few weeks. Several causes conspired to bring the buying movement to a halt, one of these being the financial indigestion due to an overdose of new companies. The capital required to finance them has been found by sales of other, often sounder, securities, but in those cases where allottees have been gambling without sufficient funds to "see them through," the shares had to be sold at prices that showed a heavy loss. The public appetite for speculation is not so keen-edged as it was a month ago. Speculation has been considerably curtailed. Many people are left nursing unwanted financial babies.

### American Interests in British Utilities.

Interesting light is shed upon the question of American purchases of shares in English electricity supply companies by a statement, made in New York, by the chairman of the Utilities Power & Light Corporation. This gentleman, Mr. H. L. Clarke, denied that his company had made any purchase of shares of public utility companies in England. He said, however, that for a number of years his Power and Light Corporation had been interested in the Greater London and Counties Trust, an English-directed company which controls a number of English utilities. The Greater London and Counties Trust is a company with £300,000 capital. Its shares are not quoted in the Stock Exchange. It is interested in Edmundsons', North Metropolitans, and a number of other companies which are developing electrical power schemes in the provinces. Edmundsons' Electricity Corporation has a stake in more than a score of different concerns. All of this is evidence that the talk of American buying of English electricity shares, current for two or three years past, has carried in it more than a germ of truth. The matter has been raised in Parliament by people rendered uneasy at the prospect of American control being established over companies that supply this country with electricity. It would be of service to know, in the light of the statement we have quoted, what proportion of capital in the Greater London and Counties Trust is the property of Americans, and whether there is any likelihood of the control passing into the hands of outsiders.

### An Urban Dilemma.

Urban Electric Supply shares have risen recently upon favourable rumours which culminated in a statement that the company had agreed to sell its Godalming property, at a good price, to the Aldershot Gas, Water & District Lighting Company. Urbans rose to £2, ex dividend, but the price has reacted to 38s. 6d. upon an unexpected check imposed upon the sale of the Godalming undertaking. The Godalming Corporation has stepped in and, claiming a prior right of purchase, has vetoed the sale. As the Electricity Commissioners have given consent to the extension of electrical power from Guildford, the town of Godalming may conceivably go to the former place for its supply. It is assumed that an amicable agreement will be reached; the slightness of the fall in the price of Urban shares shows that speculative investment is not perturbed, but the incident also demonstrates the element of uncertainty that can crop up in proposed agreements which relate to utility companies.

### Electricity Supply Reaction.

In the falling-away of prices amongst the majority of stocks and shares this month the electricity supply issues have borne their part. In City of London, as in County of London, a fair number of sellers came to market. City Lights shed 1/16, going back to 32s., but County of London lost no more than 6d., at 43s., of their previous substantial advance. London Electrics fell 6d. In the country group, Bournemouths are well held at 3¾, although a reaction in them would hardly have been surprising in view of their previous long-continued rise. Egham and Staines are 39s. Northamptons 42s. 6d. Midland Counties eased off to 30s. 6d., and Midland Electric Power Corporation at 39s. 6d. are a trifle down.

### London Tramways.

The eagerly-awaited discussion upon the proposal to hand over, for a period of years, the control of the L.C.C. Tramways system to the Traffic Combine, was postponed. This delay served merely to whet the interest aroused in the matter, although it also checked the activity that had arisen in shares of the companies likely to be affected. We think it is fair to mention that on the announcement of the L.C.C. proposals, an important financial company endeavoured to secure a substantial interest in certain tramway shares. The limited character of the market proved an obstacle to the complete fulfilment of this intention. Such companies, by reason of the character of their constitutions, can afford to look ahead for years, and they can, by virtue of their capital, lock up money upon which no immediate return may be in sight. London United Tramways ordinary shares remain at 2s., the preference at 8s 6d. Metropolitan Electric Tramways preference are changing hands on the basis of 6s. 3d. London and Suburban preference are the most popular of the group with speculators, a good many shares being dealt in daily between 11s. 6d. and 12s.

### Dividend Estimates.

Save for a decline of 2 points in Underground Electric income bonds, to 123, no change has occurred in the list of Home Railway stocks. Underground £1 shares at 26s. are the centre of quiet interest on their dividend prospects. For last year, 5 per cent. was paid, against 1¼ per cent. for 1926. The interim dividend was raised in July to 3 per cent. actual. Estimates range from 7 per cent. to 9 per cent. for the full year. In view of recent pourparlers with a section of the company's employés, the board may decide upon a conservative course in connection with the dividend.

### Atlas and Others.

The Atlas Light & Power Company publishes figures that might be held to warrant an increase in the dividend, but the directors prefer to strengthen the carry-forward, and the dividend remains at 5 per cent. for the year. The company has largely increased its capital since a year ago, and the additional payments thus involved will call for nearly £75,000 more in the way of distribution. The price of the ordinary shares is 19s. 9d., which carries the dividend now due, though it is possible that the quotation will be marked ex dividend

on the Thursday in this week. The 7 per cent. preference are being bought up to 22s. 9d.: the 6 per cent. debenture stock stands at 104 and the 5 per cent. debenture stock at 91½. Amongst shares of the lock-up order, British Columbia Power Corporation "A" are popular, at about 53½, and the "B" at 38. On the former an initial quarterly dividend of 50 cents was declared last month; taking a 2 per cent. annual dividend as a basis for calculation, the shares yield 3¾ per cent. on the money at their present price. The "B" have not yet entered the dividend list. Speculation is buying both classes of shares in the hope of their standing materially higher this time next year.

### American Utility Yields.

Columbia Gas & Electric common shares, of no par value, command 130, although the current dividend is but 5 per cent., and the yield comes to 3 13/16 per cent. Calgary Power common, of 100 dollars each, are up to 180, giving 2¾ per cent. on their 5 per cent. dividend. The company is making enormous strides, and, to finance its rapid extensions, is offering additional common shares at the price of 100, in the proportion of one new share for four old shares held. An initial installation of 36,000 horse-power is contemplated by the Calgary Power Company for its new hydro-electric power plant. The development is to have an ultimate capacity of 64,000 horse-power. The Brazilian Traction is another company the shares in which offer a very poor immediate return, but the monthly earnings justify the assumption that the figures for the current twelvemonth will be more than two million dollars in excess of those earned in the previous year. Shawinigan Water common shares at 87 yield 2¾ per cent. Pennsylvania Water and Power common return £3 per cent. at 83; Montreal Light Heat & Power £2 5s. 6d. per cent. at 107; and Consolidated Gas, Electric Light & Power, of Baltimore, £3 8s. 2d. at 88. Extravagant as it may appear to pay prices for shares on such a low basis of income-return, it is at least conceivable that buyers of these issues may feel greater cause in the future for satisfaction than some of the followers of film, dog-racing, gramophone and record, coal combustion, and other such industrials that have proved so popular during the past year or two.

### The Manufacturing Group.

Henley's have declared an interim dividend of 1s. 6d. per share, the same as before, and the price of the shares is unchanged at 5¼. Metropolitan-Vickers ordinary went back to 35s. after their previous advance on the news of the four-fold working plan. Enfield Cables weakened to 4¾. Ever-Ready shares have had a spurt of 3s. to 29s., on talk of a subsidiary, or new issue, likely to be advantageous to Ever-Ready proprietors. Meanwhile, Everlites have drooped to 8s. 6d. Other members of this group are quiet. Engineering and allied shares show a disposition to decline: the selling seems to proceed mainly from the provinces. Rubber shares hold their positions, the outlook being viewed with guarded hopefulness.

### Eastern Telegraphs Heavy.

Movements amongst cable stocks and shares are adverse to holders. Easterns, Eastern Extensions, Westerns and Globes are lower on sales that have been made by people who require the money for use in other directions. The market is in a very seesaw state, requiring little either of demand or supply to bring about sharp variation in prices. A somewhat speculative account has been built up in the Eastern quartette, and, on the change of atmosphere in the previous bullishness, prices of the four issues quietly receded. Marconis are lower for much the same reason. America has been doing nothing of any consequence in Marconi share dealings. Canadians sagged further, to 35s. 3d., and Marconi Marines went back to 55s. A pleasant exception to the prevailing dullness was furnished by a rise of 7s. 6d. in United River Plate Telephones, to 9¾. Constantinople Telephones advanced to 3¼, American Telephone & Telegraph to 191½, and Internationals to 189¼.

### Why Prices Fluctuate.

It is often complained that the Stock Exchange puts prices up or down "against" the public. Clients have been known to nourish almost a personal grievance against Stock Exchange jobbers when those clients find they cannot deal at the prices they expected. It is rarely realised that rises and falls are brought about by demand and supply in Stock Exchange securities in the same way as fluctuations in commodities. Jobbers do not go on taking stock at the same price for long if they find that the selling clearly predominates over the buying. They will quote lower prices, as a matter of precaution, if unsatisfactory news is received—a disappointing dividend, for instance—that is likely to bring in sellers. They put up prices if favourable developments occur; on the theory, of course, that more buyers than sellers may be expected. But it is the public demand and supply, either actual or anticipated, that regulate the changes. The lowering of a price, or its raising, may be quite as unpalatable to a jobber himself as to any shareholder or investor, since it may be in direct opposition to the state of his own book in the shares. Stock Exchange price fluctuations are due, in the main, to the public, whose purchases or sales dictate the tendency of every market.

# Share List of Electrical Companies.

| | Nom. £ | Dividend. 1926. | Dividend. 1927. | Price Nov. 5, 1928. | Rise or fall. | Yield. p.c. |
|---|---|---|---|---|---|---|
| **Home Electricity Companies.** | | | | | | |
| Bournemouth and Poole | 1 | 14† | 15 | 32 | — | ... ... |
| Brompton Ordinary | 1 | 8¾ | 8½ | 27/- | — | 5 8 8 |
| Charing Cross Ordinary | 1 | 8½ | 8½ | 27/- | — | 5 8 8 |
| do. do. 4½% Pref. | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Chelsea | 1 | 8¾ | 8¾ | 27/6 | — | 5 1 10 |
| City of London | 1 | 10 | 10 | 32/- | —½ | 4 7 6 |
| do. do. 6% Pref. | 1 | 6 | 6 | 28/- | — | 5 4 4 |
| Clyde Valley | 1 | 8 | 8 | 40/6 | — | 3 19 3 |
| County of London | 1 | 7½ | 7½ | 43/- | —6d. | 3 9 9 |
| do. do. 6% Pref. | 1 | 6 | 6 | 23/6 | — | 5 2 3 |
| Edmundsons' 7% Pref. | 1 | 7 | 7 | 25/6 | — | 5 9 10 |
| Elec. Supply Corporation | 1 | 11 | 11 | 57/- | — | 3 17 2 |
| Kensington Ordinary | 1 | 8 | 8 | 26/6 | — | 5 5 8 |
| Lancs. Light and Power | 1 | 7½ | 7½ | 31/- | — | 4 16 9 |
| London Electric | 1 | 8½ | 8½ | 26/6 | —6d. | 5 5 8 |
| Metropolitan | 1 | 8 | 9 | 2¼ | —½ | 4 0 0 |
| do 4½% Pref. | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Midland Counties | 1 | 6 | 6½ | 30/6 | —6d. | 4 5 3 |
| Mid. Elec. Power | 1 | — | 15 | 39/6 | —6d. | ... ... |
| Newcastle-on-Tyne Ordinary | 1 | 5 | 6 | 27/6 | — | 4 7 8 |
| do. 7% Pref. | 1 | 7 | 7 | 26/- | — | 5 7 8 |
| Notting Hill 6% Pref. | 10 | 6 | 6 | 10¾ | — | 5 11 7 |
| North Met. Elec. 6% Pref. | 1 | 6 | 6 | 23/- | — | 5 4 4 |
| St. James' and Pall Mall | 5 | 8 | 8 | 27/6 | — | 5 1 10 |
| Scottish Power | 1 | 8 | 8 | 33/- | — | 4 17 0 |
| South London | 1 | 8½ | 8½ | 27/6 | — | 5 2 8 |
| Urban Ordinary | 1 | 7 | 7 | 38/3 | —½ | ... ... |
| Westminster Ordinary | 1 | 8½ | 8½ | 27/- | — | 5 8 8 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 23/6 | —9d. | 6 7 8 |
| Yorkshire Elec. | 1 | 8 | 8 | 32/- | — | 4 5 4 |
| **Home Rails.** | | | | | | |
| Central London Ord. Assented | Stock | 4 | 4 | 73 | — | 5 9 7 |
| Metropolitan | ,, | 3 | 3 | 65 | — | 4 12 4 |
| do. District | ,, | 3½ | 4 | 79 | — | 5 1 8 |
| Underground Electric | £1 | 1½ | 5 | 26/- | — | 3 15 6 |
| do. do. Income | Bonds | 6 | 6 | 123 | —3 | 4 17 7 |
| **Telegraphs and Telephones.** | | | | | | |
| Anglo-Am. Tel. Pref. | Stock | 6 | 6 | 102½ | — | 5 17 1 |
| do. Def. | ,, | 1½ | 1½ | 24½ | — | 6 9 0 |
| Automatic Telephone | 1 | 10 | 10 | 43/9 | — | 4 9 6 |
| Eastern Extension | 10 | 10 | 10 | 25⅜ | —⅜ | *3 18 9 |
| Eastern Tel. Ord. | Stock | 10 | 10 | 254½ | —2½ | *3 18 6 |
| Globe Tel. and T. Ord. | 10 | 10 | 10 | 25½ | —1 | *3 18 6 |
| do. do. Pref. | 10 | 6 | 6 | 11½ | — | 5 8 1 |
| Great Northern Tel. | 10 | 20 | 20 | 28½ | —½ | ... ... |
| Indo-European | 25 | 10 | 10 | 47½ | — | *5 5 8 |
| Marconi | 10/- | 5 | *10 | 8¾ | —⅛ | ... ... |
| Marconi-Marine | 1 | 8½ | 12½ | 55/- | —6d. | 5 9 1 |
| Oriental Telephone Ord. | 1 | 12 | 12 | 3 | — | *4 0 0 |
| United R. Plate Tel. | 5 | 8 | 8 | 9⅜ | +7/6 | *4 5 4 |
| Western Telegraph | 10 | 10 | 10 | 25½ | —½ | 3 19 9 |

*Interim.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Home and Foreign Trams, &c.** | | | | | | |
| Anglo-Arg. Trams First Pref. | 5 | 5½ | 5½ | 8⅜ | — | 7 11 9 |
| do. do. 2nd. Pref. | 5 | 6 | 6 | 8½ | — | 8 11 6 |
| do. do. 5% Deb. | Stock | 5 | 5 | 79½ | — | 6 5 9 |
| British Electric Traction Def. Ord. | ,, | — | — | 545 | — | ... ... |
| do. do. Pref. Ord. | ,, | 3 | 7½ | 125 | — | 6 0 0 |
| Brazil Traction | 100 | 6 | 7 | 72½ | —1 | 3 8 3 |
| Brit. Colombia Elec. Rly. Pcc. | Stock | 5 | 5 | 96½ | — | 5 2 7 |
| London & Sub. Trac. 5% Pref. | 1 | Nil | Nil | 11/6 | — | ... ... |
| London United Tram Deb. | Stock | 4 | 4 | 60½ | — | 6 12 3 |
| Mexico Trams, 5% Bonds | — | 5 | 5 | 78 | — | 6 8 2 |
| Mexican Light Common | 100 | Nil | Nil | 77½ | — | ... — |
| do. 7% Pref. | 100 | Nil | 7 | 79½ | — | 8 16 2 |
| do. 1st Bonds | — | 5 | 5 | 76½ | — | 6 10 9 |
| Yorkshire (West Riding) | 1 | Nil | Nil | 5/- | — | ... ... |
| **Manufacturing Companies.** | | | | | | |
| Babcock & Wilcox | 1 | 13 | 15 | 3⅞ | — | *4 7 2 |
| British Aluminium Ord. | 1 | 10 | 10 | 2¾ | — | *4 9 6 |
| British Elec. Transformer Pref. | 1 | 7 | 7 | 18/- | — | 7 15 0 |
| British Insulated Ord. | 1 | 15 | 15 | 4⅞ | — | 3 11 9 |
| Brush Ord. | 1 | 10 | 10 | 28/9 | — | 6 19 3 |
| Callenders | 1 | 15 | 15 | 4⅞ | — | 3 11 6 |
| do 6½% Pref. | 1 | 6½ | 6½ | 1¾ | — | 5 4 0 |
| Crompton Parkinson Pref Ord. | 1 | — | 6 | 19/- | — | 6 6 4 |
| do. 6% Pref. | 1 | — | 8 | 26/3 | — | 6 2 6 |
| Edison-Swan | 4/- | 10 | 10 | 12/6 | — | 3 4 0 |
| do. 6% Deb. | Stock | 5 | 5 | 89½ | — | 5 11 9 |
| Electric Construction | 1 | 7½ | 7½ | 27/6 | — | 5 9 1 |
| Enfield Cable Ord. | 1 | 20 | 20 | 4¾ | —⅛ | 4 4 6 |
| English Electric | 1 | Nil | Nil | 7/6 | — | ... ... |
| do. do. Pref | 1 | 3 | Nil | 10/- | — | ... ... |
| Gen. Elec. Pref. | 1 | 6½ | 6½ | 25/- | — | 5 4 0 |
| do. Ord. | 1 | 7½ | 10 | 42/- | — | 4 16 8 |
| Henley | 1 | 25 | 25 | 5¼ | — | 4 5 0 |
| do. 4½% Pref. | 5 | 4½ | 4½ | 4⅞ | — | 5 6 0 |
| India-Rubber | 1 | Nil | Nil | 13/9 | — | ... ... |
| Johnson & Phillips | 1 | 12½ | 10 | 2 | — | 5 0 0 |
| Met.-Vickers Ord. | 1 | 8 | 6 | 35/- | —½ | 3 8 7 |
| do. Pref. | 2 | 8 | 8 | 21½ | — | 5 19 6 |
| Siemens Ord. | 1 | 7½ | 7½ | 1½ | — | 5 4 2 |
| Telegraph Construction | 12 | 10 | 10 | 25 | — | *4 16 2 |

*Dividends paid free of Income Tax.

†4% of which was tax free.

# The Trade and Industry of Japan.

## Home Production Growing.

A REPORT upon economic conditions in Japan, to June 30th last, has been compiled by Messrs. G. B. Sansom, C.M.G., and H. A. Macrae, M.A., respectively Commercial Counsellor and Acting Commercial Secretary at the British Embassy, Tokio. (Stationery Office, 3s. net.) This report, which is one of the regular Department of Overseas Trade series, reviews in some detail recent financial movements in Japan, and also shows how the country is advancing in many branches of manufacturing.

In the last few years Japan has passed through several financial crises attributable mainly to the fact that the financial organisation of the country is not properly adjusted to its general economic and political condition. On the industrial side Japan started with the advantage of other nations' experience, although in some respects this has not always worked out in practice. The textile industries supply both home and foreign markets, and constitute the chief source of income in foreign trade. Other industries, of which electrical manufacturing is one, do not export to any great extent, but they have caused a diminution in the volume of imports.

### Electrical Imports.

The above-mentioned shrinkage is very apparent in the case of machinery of all kinds. In 1924 the total value of imports of this class was 128,523,000 yen*, in the three subsequent years the figures were 88,996,000 yen, 90,686,000 yen, and 78,381,000 yen. The principal supplying countries in 1927 were the United States (31.11 million yen), the United Kingdom (20.75 millions), Germany (17.60 millions), and Switzerland (4.55 millions). The general tendency is reflected most strongly in the item "Dynamos, electric motors, convertors, transformers and armatures." The total imports of these fell from 20.98 million yen in 1924 to 11.98 millions in 1925, and 10.69 millions in 1926. The bulk of the 1926 total is attributed to the United States, whose share is put at 7,374,000 yen. Germany was second with 1,320,000 yen; then follow Great Britain (1,141,000 yen), Switzerland (540,000 yen), and France (89,000 yen).

### Electrical Production.

The foregoing figures constitute evidence of the progress of domestic manufacture, particularly since they record a decrease in imports in a period when electrical enterprises in Japan are rapidly expanding. A number of Japanese works now produce generators rated up to 10,000 kW and motors of several thousand horse-power. It is difficult to assess the share of manufacturers in supplying electrical equipment, but the following estimate from a trade paper is probably not far out: Japanese 56 per cent., European 13 per cent., and American 31 per cent. In smaller machinery and apparatus, *e.g.*, fans, telegraphic instruments, small motors, telephones, &c., Japan is almost self-supporting. The market for appliances such as heaters, cleaners, cookers, refrigerators, &c., is not yet much developed, but shows signs of improvement. It is estimated that the value of electrical machinery produced has risen from 49.5 million yen in 1917 to 105.2 millions in 1927; of electric lamps from 10 to 16 million yen; and of wire and cable from 52 to 113 million yen. An appendix to the report shows that in 1926 Japan exported insulated electric wire valued at 1,865,000 yen; in the following year the value rose to 1,944,000 yen.

Generally speaking, the present situation is that where price is the first consideration, orders go to Japanese makers, except for certain large transformers and turbines and light traction units; while where quality is the first consideration, foreign suppliers can compete despite the customs duties. The future of the import trade in electrical machinery and apparatus seems to depend largely upon the growth in Japan of a demand for high-quality manufactures. If that demand grows quickly Japanese makers will probably not be able to keep up with it for some time. It must be remembered that in this, as in other trades, Japan is a "buyer's market," so that competition among sellers is severe and terms are exacting. As a general rule no supplier of electrical machinery or apparatus can hope for success unless he is represented in Japan by experienced and energetic agents.

### The Electricity Supply Industry.

According to statistics prepared by the Ministry of Communications, the total generating capacity of Japanese electricity undertakings was 1,100,000 kW at the end of 1919; at the end of 1926 it was 3,200,000 kW installed and operating; while a further 1,650,000 kW was under construction. The total authorised capital of the industry is over 3,000 million yen, of which about 2,400 millions is paid up. Of the total generating capacity at the end of 1926, 1,965,000 kW was hydro-electric plant. Foreign capital has assisted largely in this electrical development; at the end of 1927 the sterling and dollar loans of the principal light and power companies amounted to about £25,000,000.

"Rationalisation" has been most marked in the electric power industry. Mergers of small power companies with larger ones have taken place in recent years, and there is now in contemplation a large combine which would include the Tokio Electric Light Co. and the Tokio Electric Power Co., themselves recently consolidated. Other large power companies are discussing agreements to prevent competition and to curtail the expenses of operation. There is no doubt that such large corporations can become very important and powerful in Japan, where the production and consumption of electricity grows rapidly. The authors consider that the recent lavish borrowings have perhaps been too large for sound development. At the end of 1927 an Electric Bond and Share Co. was formed in Tokio for the purpose of investing in electric power and transport undertakings. Its promoters include representatives of large Japanese firms, like Mitsui and Mitsubishi, the General Electric Co., the Whitehall Trust, the Guaranty Co. of New York, and the light and power companies themselves. Another feature of the Japanese industrial system is the growing concentration of power in a few hands. The report instances the Mitsubishi Co., which has a capital of 120 million yen and controls a number of large and varied enterprises, including an electrical engineering company with a capital of 15 million yen.

### Broadcasting and Radio Apparatus.

Radio broadcasting was commenced in Japan about three years ago, but the power of the three original stations at Tokio, Osaka and Nagoya provided only a small "crystal range," and the demand was mainly for valve sets, which limited the demand to those who could afford these sets. Now, however, the power of the Tokio and Osaka stations has been raised to 10 kW; Nagoya is expected to follow suit, and six similar stations are being opened. These developments, it is expected, will greatly increase the use of inexpensive crystal sets. At the commencement dealers in radio apparatus overstocked considerably, and consequently, in 1926, there was a severe slump, and many dealers failed. Now these surplus stocks have been cleared off, but in the interval Japanese firms have taken up the manufacture of apparatus. The import duty upon radio apparatus was originally 20 per cent., but a year or so after it was raised to 40 per cent. This practically eliminates business in made-up articles, which are now turned out in Japan, but there is still some opening for materials required by the Japanese makers, such as good quality magnets, enamelled wire for coils, crystals, &c. Such parts as transformers, condensers, &c., and complete sets are practically ruled out. Some opportunity should occur for headphones, which are not made in Japan to any extent. Generally speaking, English headphones are too dear as compared with German. Valves are made in Japan, although some business is still done in American "tubes." British makers must remember that the American style base is employed in Japan. Contrary to a very prevalent idea, quality and condition are studied in Japan, and manufacturers must attend to this and cater especially for the needs of the market.

### Trading Advice.

As was mentioned above, the report emphasises the fact that Japan is a "buyer's market." Accordingly, Great Britain finds the number of her competitors increased. The margin of profit is necessarily small, and the changing character of the market requires constant attention. As a new industry develops, the importation of one commodity ceases or declines, but other requirements, whether of plant or accessories, or material for ancillary industries, have to be met. Success can only be obtained by those who can maintain representation on the spot, or can make periodical visits to the country. Where the volume of business does not justify the expense of direct representation, traders are at a disadvantage as compared with exporters in less distant countries, unless they can make use of a reliable foreign or Japanese agent who is well acquainted with local conditions. In recent years there has been a tendency among manufacturers and merchants at home to transfer their agencies from British firms operating in Japan to Japanese firms. While the change has often been justified by results, there is no doubt that foreign houses established in Japan perform a valuable function, and the advantages to be derived from their experience should not be overlooked by exporters in Great Britain who contemplate changing or appointing agents. In Japan there is a strong public sentiment in favour of domestic manufactures, and in certain commodities Government departments have been instructed to give preference to Japanese products, even though they cost more than imported goods.

* £1=10 yen (approx.).

# The Import Trade of China.

### Statistics for 1926 and 1927 Compared.

THE following table shows the imports into China last year of electrical and allied material and machinery. The corresponding figures for 1926 are given and notes of increases or decreases added. The trade in electrical plant and material continues to grow despite the revolutionary disturbances during the year. In this growth under adverse circumstances there is a striking hint of the magnitude of the trade that would be possible if peace were restored and the spread of Western methods resumed throughout the vast territories of China. It is noteworthy that while Japan's trade in electrical materials and fittings has advanced, Great Britain's lead in machinery has been well maintained. It is probable that a great deal of the trade credited to Hong-Kong was transacted with the United Kingdom. The Haikwan tael fell in average value from 3s. 5¼d. in 1925 to 3s. 1½d. in 1926, and to 2s. 9 13/16d. in 1927.

| Country whence imported. | 1926. Taels. (thous.) | 1927. Taels. (thous.) | Inc. or dec. Taels. (thous.) |
|---|---|---|---|
| *Brass and yellow metal; bars, sheets, wire, &c.—* | | | |
| Total ... ... ... | 1,650 | 1,654 | + 4 |
| Hong-Kong ... ... ... | 181 | 383 | + 202 |
| Great Britain ... ... ... | 30 | 44 | + 14 |
| Japan ... ... ... ... | 1,256 | 1,072 | – 184 |
| Belgium ... ... ... | 3 | 4 | + 1 |
| United States ... ... ... | 5 | 2 | – 3 |
| Germany ... ... ... | 154 | 142 | – 12 |
| France ... ... ... ... | 3 | — | – 3 |
| *Copper bars, rods, sheets, plates, nails, and wire.—* | | | |
| Total ... ... ... | 1,110 | 1,036 | – 74 |
| Hong-Kong ... ... ... | 29 | 62 | + 33 |
| Great Britain ... ... ... | 26 | 59 | + 33 |
| Japan ... ... ... ... | 975 | 772 | – 203 |
| Germany ... ... ... | 41 | 104 | + 63 |
| Belgium ... ... ... ... | 2 | 8 | + 6 |
| United States ... ... ... | 13 | 20 | + 7 |
| *Electrical materials and fittings.—* | | | |
| Total ... ... ... | 8,941 | 9,868 | + 927 |
| Hong-Kong ... ... ... | 379 | 778 | + 399 |
| Great Britain ... ... ... | 1,666 | 1,589 | – 77 |
| Italy ... ... ... ... | 90 | 111 | + 21 |
| Japan ... ... ... ... | 3,407 | 4,090 | + 683 |
| Canada ... ... ... ... | 46 | 63 | + 17 |
| United States ... ... ... | 1,422 | 1,561 | + 139 |
| Sweden ... ... ... ... | 31 | 13 | – 18 |
| Belgium ... ... ... ... | 109 | 213 | + 104 |
| Holland ... ... ... ... | 194 | 123 | – 71 |
| France ... ... ... ... | 215 | 243 | + 28 |
| Germany ... ... ... | 1,351 | 966 | – 385 |
| *Propelling machinery, such as boilers, turbines, &c.—* | | | |
| Total ... ... ... | 1,916 | 2,980 | +1,064 |
| Great Britain ... ... ... | 683 | 1,227 | + 544 |
| Japan ... ... ... ... | 202 | 292 | + 90 |
| United States ... ... ... | 298 | 539 | + 241 |
| Sweden ... ... ... ... | 148 | 41 | – 107 |
| Germany ... ... ... | 344 | 188 | – 156 |
| Belgium ... ... ... ... | 93 | 503 | + 410 |
| Italy ... ... ... ... | 9 | 30 | + 21 |
| *Telegraph and telephone material.—* | | | |
| Total ... ... ... | 2,053 | 2,066 | + 13 |
| Hong-Kong ... ... ... | 49 | 243 | + 194 |
| Great Britain ... ... ... | 141 | 443 | + 302 |
| Japan ... ... ... ... | 271 | 237 | – 34 |
| Canada ... ... ... ... | 9 | 10 | + 1 |
| United States ... ... ... | 72 | 212 | + 140 |
| Sweden ... ... ... ... | 96 | 97 | + 1 |
| Germany ... ... ... | 875 | 242 | – 633 |
| Belgium ... ... ... ... | 165 | 350 | + 185 |
| France ... ... ... ... | 93 | 73 | – 20 |
| Italy ... ... ... ... | 147 | 5 | – 142 |
| *Scientific instruments and apparatus.—* | | | |
| Total ... ... ... | 1,318 | 1,244 | – 74 |
| Great Britain ... ... ... | 138 | 102 | – 36 |
| Germany ... ... ... | 377 | 314 | – 63 |
| Belgium ... ... ... ... | 1 | — | – 1 |
| France ... ... ... ... | 37 | 27 | – 10 |
| Japan ... ... ... ... | 471 | 492 | + 21 |
| United States ... ... ... | 212 | 197 | – 15 |
| *Machinery for electric power stations.—* | | | |
| Total ... ... ... | 831 | 1,292 | + 461 |
| From Great Britain ... ... | 186 | 605 | + 419 |
| ,, Germany ... ... | 130 | 94 | – 36 |
| ,, Japan ... ... ... | 160 | 23 | – 137 |
| ,, United States ... ... | 135 | 259 | + 122 |
| ,, Hong-Kong ... ... | 165 | 59 | – 106 |

# The Electrical Market of Greece.

### British Manufacturers Favoured.

IN a report upon economic conditions in Greece recently prepared for the Department of Overseas Trade (Stationery Office, 2s. net), Mr. R. M. A. Turner, O.B.E., Commercial Secretary in Athens, says that the outstanding feature of 1927 was the large measure of success which attended the efforts of the Government to re-establish the financial position of the country. This success was only obtained by stringent measures of retrenchment and increased taxation, and the effects of the application of such a policy are so divergent and so often contradictory, that it is difficult to obtain a true conception of the actual economic state of the country. While the increased import duties were expected to tend to reduce imports, the stabilisation of the drachma and the absence of political upheavals gave a much-needed feeling of security to importers and the general public, and foreign trade thereby tended to increase.

#### Electrical Development and Trade.

Throughout the country in recent years there has been an increase in the erection of plant for the production of electrical energy, and it is stated that during the last two years the number of new plants so installed amounts to about 50. In 1926 the production of energy was estimated at 40 million kWh; last year it is calculated that the production rose to 48 million kWh. To some extent recently water power has been harnessed with this object, and certain other schemes are under consideration, some of them in connection with drainage and reclamation projects. Most of the electricity is generated, however, by steam and internal combustion plant.

Mr. Turner draws particular attention to the considerable imports of internal combustion engines, dynamos, and electric motors, and says that British manufacturers already enjoy no small share of this trade, and that the leading position occupied to-day by British electrical manufacturers is becoming more generally recognised.

Appendixes to the report show that in 1927 Greece imported 625,030 kg. of motors and dynamos valued at 22,457,400 drachmæ (£60,000 approx.). Cables, wire, &c., were imported to the extent of 8,047,000 kg., the value being 67,635,000 drachmæ (£180,000 approx.), but electrical cables are not shown separately. A list is given of the principal German imports during 1926 and 1927; this includes "electrical machines and electrical articles," the figures for 1926 being shown as 2 million marks (£98,000 approx.), and that for 1927 1.7 million marks (£83,000 approx.). No similar list of United Kingdom goods appears. Under the heading "metals and metal goods," Great Britain, with 21,181 tons, is shown as third to Belgium (48,563 tons) and Germany (21,184 tons), the total being 114,634 tons.

It is mentioned that work has been started by one of the subsidiary companies of the Power & Traction Finance Co. on the electrification of the Athens-Kephissia Railway, and the tunnel and underground station at Omonia Square, Athens, connecting the line to the Athens-Piræus Railway, is in course of construction.

#### British Trade.

The report says that on the whole British trade with Greece during 1927 proceeded satisfactorily. The British Consul-General at Salonica reports, for instance, that in his district imports of British manufactured products increased by 66 per cent. as compared with the preceding year. The probable explanation of the increased sales, apart from the generally increased trade activity during 1927, is that British goods were offered at more competitive prices and on easier terms of payment.

Care should, of course, be exercised in granting credit. The necessity of a British firm desiring to do business in Greece of securing the services of a really good local agent cannot be too strongly emphasised. Such an agent will be able to advise when credit may be safely and usefully given, and when withheld. It is naturally depressing both for agent and principal to see orders booked by competitors, but in the present state of the market a conservative policy is undoubtedly to be recommended.

#### Water Power in Crete.

The Government of Greece is to undertake the establishment of hydro-electric works in the island of Crete by utilising the River Aglva. The expenditure is estimated at 30 to 32 million drachmæ, which is to be raised by the town of Canea at the Greek National Bank. A foreign firm is to be entrusted with the work of regulating the river and the supply of electrical machinery, it being proposed to install three turbines, each of 400 h.p. If the water power of the Aglva should prove to be insufficient it is intended also to utilise that of the river Bentsounaria.

# Electrical Breakdowns and Failures.

## Some selections from the Technical Report for 1927 of the British Engine, Boiler and Electrical Insurance Co., Ltd.

THE annual Technical Report of the British Engine, Boiler and Electrical Insurance Co., Ltd., for last year, which is now available at 7s. 6d. per copy (head office of the company, 24, Fennel Street, Manchester), contains, as usual, many interesting examples of breakdown and defects of machinery, both electrical and mechanical, which came under the company's notice during the year. In the following we briefly refer to a few selected items from the more interesting and, in some cases, curious instances cited in the report.

An interesting case of failure due to poor design was in connection with a 3,000-kW impulse-type steam turbine, 3,000 r.p.m., 260 lb. per sq. in. The vacuum was seen to fall and the steam was shut off immediately. The turbine was opened out, and it was found that two buckets had been torn out of the last wheel and that a large length of shrouding of the same wheel had been torn away, damaging the tangs of 25 buckets. One of the condenser tubes had been cut in two by a flying bucket, and five others were damaged. Examination of one bucket showed that it was made of a 5 per cent. heat-treated nickel-steel, which was clean and had a fine structure. Failure had progressed gradually from the concave side, where it had started at the sharp junction of the root with the body.

Damage to a 1,500-kW turbo-alternator, three-phase, 2,850 V, 50 cycles, 3,000 r.p.m., appears to have been due primarily to a local defect having developed in the insulation between the stator conductors. Smoke was noticed coming from the

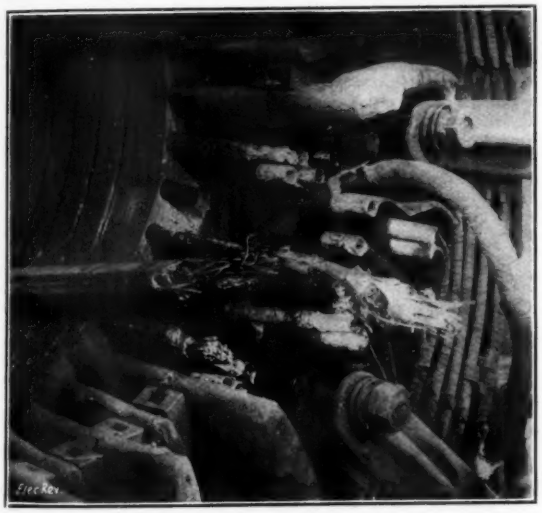


**Fig. 1.—Damaged Coils Resulting from Local Defect.**

generator. It was immediately shut down and the end covers removed, when it was seen that arcing had taken place at the end of the stator core, between two of the conductors in one of the slots, resulting in their being fused completely through and in the third conductor being considerably burnt, as were also the core laminations. The damaged coils and core are shown in fig. 1. The damage took place at a part where the normal pressure to earth was only 550 volts. The increase of voltage between turns at such a point, due to a surge, would be small compared with what might be expected at parts nearer a terminal. About six weeks before the failure a violent "kick" was noticed on the system, which resulted from the failure of a h.p. insulator at another generating station linked up with the system. A fortnight later there was another violent kick, due to a transformer burning out in a distribution sub-station. On the day of the failure several similar disturbances were noticed at the power station, and the switch on a distributing feeder from a small l.p. sub-station tripped. Supply was resumed on a spare feeder, but testing failed to show any fault on the first. A message was also received from another district just before the failure that motors were running below speed, and it was noticed that the voltage across one phase was 25 per cent. lower than that across the other two. The repair entailed the complete stripping of the stator laminations and windings, after which the core was rebuilt and rewound, the laminations of one section being renewed.

Lack of care in the making of joints was apparently the cause of failure of a 1,000-kW turbo-alternator, 500 V, three-phase, 50 cycles, 3,000 r.p.m. The first indication of anything being amiss was a smell of burning insulation in the engine room. When the end covers were removed, a fault was found in a soldered joint between two neighbouring coils of the stator windings, the surrounding insulation being damaged by arcing. The coils were wound with two 0.2-sq. in. conductors in parallel; each jointing sleeve therefore contained four conductors. The winder, who had used soldering irons in making the joints, appears to have lacked the degree of skill essential to ensure a satisfactory result by this means on such a joint. Several of the other joints were also found to be unsound.

A case of excessive heating due to insufficient ventilation bringing about a failure was a 1,000-kW turbo-generator, 1,250 kVA, 500/525 V, three-phase, 50 cycles, 1,500 r.p.m. The rotor was of the salient-pole type, with four poles, and the core consisted of a single casting secured to the shaft by means of three feather keys. While the machine was being run up to speed and the rotating field was being excited, excessive vibration was noticed. The vibration became greatest when full speed and excitation were attained, but ceased when the excitation current was cut off. The vibration was felt most at the exciter end, and was so marked at this part that an oil pipe supplying the exciter end bearing was fractured. The set screws securing the wedges for the coils were found to be loose, and it appeared that movement of the wedges had been taking place. This was rectified, but when the rotor, after being statically balanced, was tested in the bearings, the vibration was found as marked as before. Owing to the low ohmic resistance of the windings, difficulty was experienced in determining by test whether the vibration was caused by one or more short circuits between the turns of the coils. It was considered, however, that the results of the tests justified all the coils being stripped and rewound. When the set was put back to work it was found that the vibration had been stopped completely.

The next example illustrates failure from the over-tightening of studs and bolts. Two failures occurred on a 30-b.h.p. squirrel-cage motor, 500 V, three-phase, 50 cycles, 1,500 r.p.m., used for driving a coal cutter. On the first occasion three of the rotor clamping bolts broke at the screw threads, and the resulting movement of the stampings caused the breakage of several bars of the winding. On account of the severity of the damage a new rotor was supplied; this was a stock rotor similar to the first. The second failure occurred a few days after the new rotor had been installed. On this occasion all the six rotor clamping bolts broke, and the flying parts struck and destroyed the stator end windings. The metal of the bolts was sound, but the screw threads were found considerably distorted. Their failure was entirely due to excessive force having been used when the bolts were tightened up.

A case illustrating failure due to the faulty keying of rotors was a 12½-b.h.p. squirrel-cage induction motor, three-phase, 650 V, 40 cycles, 1,160 r.p.m., driving a coal conveyor of the jigger type through spur gearing. The rotor core was mounted on a three-armed spider; a longitudinal key was fitted with the object of preventing radial and circular movement of the core, and a circular key without any form of locking device rested in a slot at one end of the outer surface of each spider arm, so as to prevent axial movement. Owing to vibration set up by the gear wheels being eccentrically fitted and by the load from the conveyor being impulsive, and owing to the longitudinal key, which was not a good fit, allowing slackness of the core, the circular keys worked out of the rotor core, resulting in movement of the stampings and in the core plates fouling the stator end windings. In order to make the repair effective the stator had to be rewound, the longitudinal keyways in the core and the spider to be re-cut, and a new key fitted.

Shaft failure was the cause of breakdown of a 500-b.h.p. synchronous motor, three-phase, 50 cycles, 2,200 V, 187 r.p.m., constructed with salient poles and used for driving a grinder in a cement works. The rotor was supported on two pedestal bearings bolted to the bedplate, and drove the load through a magnetic-clutch coupling and an extension shaft which were supported by similar bearings mounted direct on the concrete foundation. At the far end of the extension shaft was an overhung pinion for driving the grinder. During the greater part of its life the machine had only been working at half load, but during the month prior to the accident it had been fully loaded. On the day of the failure it had been working from 8 a.m. till 1.30 p.m., when the head electrician, who chanced to be at hand, heard a noise and noticed smoke coming out from the bearing at the clutch end. The machine was at once stopped. On the bearing being opened out, the shaft was found to have broken spirally, the fracture lying just clear of the hub of the coupling and extending a short distance into the journal. Judging by the position of failure it was inferred that the shaft had broken through having

to carry an abnormal stress. Although it could not be traced that there had been a lack of alignment, it would appear that the clutch had not always engaged concentrically.

The breakdown of a 35-b.h.p., d.c., compound-wound motor, four-pole, 450 V, 850 r.p.m., driving a coal cutter through bevel gearing, was traced to commutator failure. The commutator bars were secured by two V-rings and a ring nut was screwed on to the shaft. Owing to the vibration to which the motor was subjected, the ring nut worked loose, releasing all the commutator bars, with the result that they were damaged considerably. The appearance of the armature after the accident is depicted in fig. 2. It was necessary for a new commutator to be fitted, and as a security against future trouble two grub screws were fitted, passing through the ring nut into the shaft.

Carelessness in aligning running parts resulted in the failure of a 275-b.h.p., slip-ring induction motor, 400 V, three-phase, 50 cycle, 353 r.p.m., driving cotton-preparation machinery through a flexible coupling. Trouble was experienced owing to the rotor fouling the stator. Several rotor and stator wedges were found charred. When the rotor was withdrawn several of the rotor teeth were seen to be damaged, a number being torn away at the roots. The insulation had deteriorated with the heat generated by the rubbing, and some of the rotor bars were fused by the resulting arcing. The complete machine was sent to the makers for repair. The rotor and spider were found secure on the shaft, but in view of the extent of the damage the rotor was reconstructed entirely and the stator re-wound and re-insulated. The alignment was found good, but an examination of the flexible coupling showed that the pins were considerably out of line. This, combined with slackness in the adjoining bearing, had caused the damage.

Trouble with a 35-b.h.p. motor, 440 V, three-phase, 25 cycles, 715 r.p.m., used for driving an overhead crane, was traced to faulty material. While the machine was being hoisted bodily to its seat on the crane by means of a hand-power pulley block, the eyebolt by which it was slung from the shackle of the lifting sling broke. The motor dropped some 30 ft. to the ground and was smashed beyond repair. The eyebolt, a steel drop-stamping, was found to have broken at the top screw-thread; rupture was sudden, and the surface of fracture appeared moderately crystalline. Under the microscope it was seen that the metal was clean at the outside, but that there were small inclusions at the inside. The structure at the surface of fracture was unsatisfactory. The faulty microstructure was evidently produced by the bolt being improperly heat treated after it was stamped, the metal having been subjected to a prolonged annealing treatment at a temperature not far below the lower critical range.

An instance of poor workmanship was a 500 kW, oil-cooled, core-type transformer, three-phase, 50 cycles, 550/3,300 V, used for a factory power supply. The transformer was working on normal load, when the trip gear of the oil switch on the supply side suddenly came into action. It was then found that an earth fault had developed in the low-pressure winding of the middle leg, and that a short circuit between the low- and the high-pressure windings had followed. The core plates, the windings, and the intervening insulation had been damaged at the points of arcing, and the insulation of the remaining h.p. coils had suffered unavoidably while the windings were being dismantled. All the windings and the insulation of the leg had to be renewed, and the damaged core plates straightened out. The oil when tested was found satisfactory, and the failure was the result of the sharp edge of a core plate having cut into the leatheroid insulation.

Failure of the water supply in frosty weather caused a two-cylinder, horizontal oil engine of the high-compression solid-injection type, 230 r.p.m., to give out. One day a loud report was heard, but the engine continued to run quietly. The attendant examined the engine and saw water flowing from a crack on the underside of one of the jackets and about 6 in. from the front end. The engine was stopped, and on an examination being made, the crack was found to extend in a circular direction for more than half the circumference of the jacket. When the liner was drawn a large quantity of soft sludge was found in the lower part of the water space. As a sound repair was evidently impracticable, a new bedframe was fitted. The cooling water for the jackets was drawn from a lake, and pumped into a large overhead tank, from which it was piped to the underside of the jackets. The hot water leaving the tops of the jackets was allowed to run to waste. It is probable that the sludge had formed a barrier, preventing the effective cooling of the front part of the jacket and resulting in overheating. This was followed evidently by a sudden movement of the sludge which allowed cold water to rush into the lower overheated portion, with the result described.

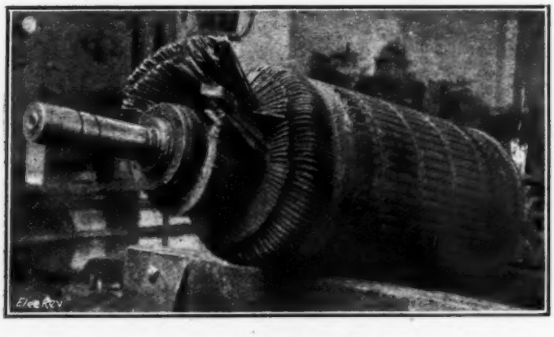


**Fig. 2.—Commutator " Burst " ; 35-h.p. D.C. Motor.**

A case of piston failure of a four-cylinder, vertical, two-stroke oil engine, with crankcase compression, 250 r.p.m., is recorded. While the usual load was being carried, a loud noise was heard in one of the crank chambers, and the engine was shut down for examination. It was found that the piston had broken at the bottom of the groove for the oil-scraper ring, and that the lower portion had dropped into the crank casing, where it had fouled the crank and the connecting rod. The lower portion of the piston was broken into many pieces, and one of these had jammed between the crank and the side of the casing, causing a large piece of metal to be broken away from the latter. The cylinder bore was carefully examined, but was found free from all signs of seizure. The cause of the accident was unknown, but it was surmised that the piston had suffered a blow, during either manufacture, transit, or erection, which had started a crack.

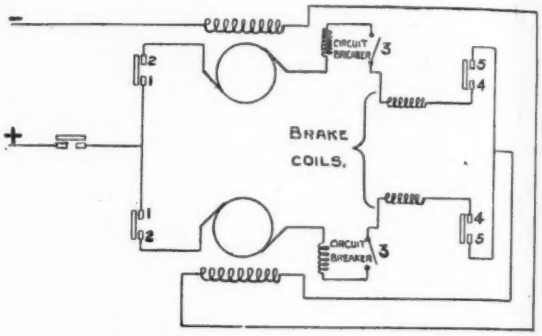



**Fig. 3.—Bad Example of Crane Control Connections.**

Among a number of examples of electric lift failures the following is interesting. During an attempt to set in motion an electrically-driven 7½-ton Goliath crane of angle-iron construction, having the hoisting motion driven by a 15-b.h.p. motor, the cross traverse by a 3-b.h.p. motor, and the longitudinal travelling motion through trains of gear wheels by two 7.5-b.h.p. series-wound motors with the armatures in parallel and the fields in series, and geared to the travelling wheels, one motor to either side, it was noticed that one of the longitudinal travelling motors would not respond to the controller. Examination showed that the final spur wheel was broken through one of the holes through which it was bolted to the face of the travelling wheel, the crack extending to the rim; one of the teeth at the end of the crack was broken away, while two others were missing from the spur wheel that engaged with it on the intermediate shaft. The arrangement of the motors was most unsatisfactory. The two fields were in series with the parallel armatures. Such an arrangement meant that as soon as current was switched on both fields would be energised, but with a faulty contact in the armature circuit of one motor the armature of the other only would take the load; and as the wheels on one side of the crane were not mechanically coupled to those on the other, cross binding would inevitably result. With the method of connecting adopted there was considerable danger of an open circuit, owing to the large number of points at which contact might prove faulty. The arrangement involved five movable contacts at which an open-circuit might occur, besides those at the brushes and circuit breakers. These are shown and numbered in the diagram of connections, fig. 3. The contacts 1, 2, 4 and 5 in each circuit are not only redundant, but a source of danger.

## Pulverised Coal in the United States.

Reports received by the National Electric Light Association show that the use of pulverised fuel for firing boilers continues to increase in the United States. The Pulverising Committee of the Association finds that boiler horse-power served by pulverised fuel in service in 1927 increased by about 170,000 tons, compared with 1926, based on data (United States and Canada) submitted by equipment manufacturers. According to the Committee, the increased use of the unit system of firing is particularly noticeable in industrial plant. The unit system was used on only a comparatively small scale before 1926, but is now being considered for larger units, although as yet few such installations have been made. The Committee reports that nearly all air separation mills are now designed for the use of preheated air for drying coal in the mills, and that in general this procedure has worked satisfactorily.—*Reuter's Trade Service* (New York).

# The Electrical Industry.

## Some Considerations of the Economic and Industrial Aspects of the Subject.

By LIEUT.-COL. K. EDGCUMBE, T.D., R.E.T.(Ret.), M.I.E.E.

*(Extracts from the Presidential Address delivered before the* INSTITUTION OF ELECTRICAL ENGINEERS.)

*(Concluded from page 778.)*

### An Economic Necessity.

I am not considering tariffs, or safeguarding, or any of those questions which have so unfortunately become political; nor is it that I grudge our foreign friends their orders, but I regard curtailment of imports as an economic necessity of the moment and, let us hope, of the moment only, the result of conditions brought about by the world war.

It is sobering to remember when tempted to buy a foreign-made article, with the idea of saving a shilling or eighteenpence, that it will at the moment involve keeping one of our own people out of a job for a whole day. Similarly, when a Corporation places an order abroad for £50,000 worth of plant, the chief sufferers are the unemployed, some 500 operatives being kept out of employment for over six months.

The Empire Marketing Board might well take up this matter. With the possible exception of Canada, none of the Dominions would be adversely affected, and the necessity is urgent. Without it, the Government's transference scheme is foredoomed to failure, not from any lack of goodwill on the part of employers, but solely because there is not, at present, enough work in the country "to go round." Employment in no part of the country is so good that industry can assimilate an appreciable number of transferees unless additional business is provided. As well wait for supply and demand to eradicate unemployment as for evolution to eradicate measles.

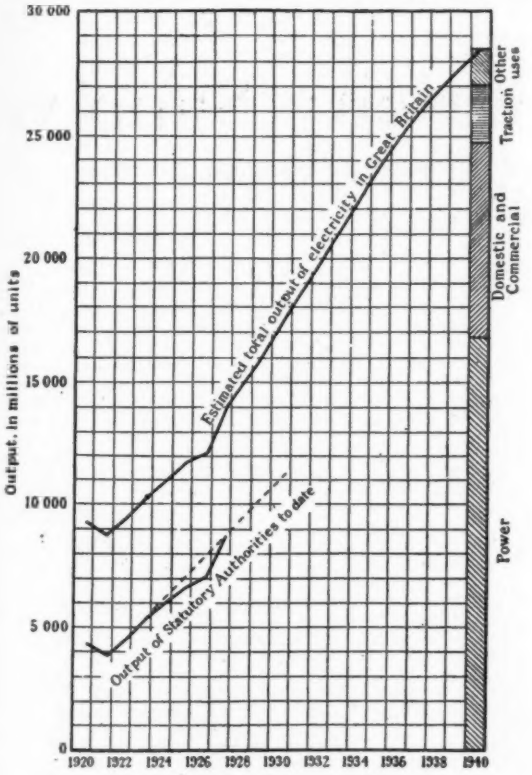



**Fig. 4.—Estimated Future Output of Electricity.**

I have devoted an inordinate amount of time to industrial considerations which affect other industries quite as much as our own, because our profession is of all the most dependent upon the general level of prosperity in the country.*

### The "Electrical Barometer."

The annual output of electrical energy represents a kind of "prosperity index" for every branch of the profession. I have thought it worth while, therefore, to piece together such data as seemed relevant, with a view to forecasting the course of our prosperity index during the next 10 or 12 years. I have had the valuable assistance of Mr. Hugh Quigley, of the Statistical Department of the British Electrical Manufacturers' Association, and fig. 4 is the result of those efforts. The lower curve shows the energy supplied by the statutory undertakings up to date, and the dotted straight line indicates what would be their future output if the annual increase continued as during the last few years. This rate of increase is a minimum,

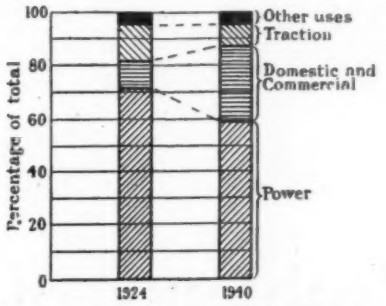



**Fig. 5.—Allocation of Electricity Output.**

based as it is upon five years during which the industrial conditions of the country have been worse than any known to the present generation; but, taking the facts as they stand, the output at the present time is increasing at the rate of about 10 per cent. per annum in the case of the statutory authorities, and probably at a slightly lower rate for the country as a whole.

Figures of 15 or even 20 per cent. have been quoted as representing the annual rate of increase, but they are misleading, being based upon the output for 1927, as compared with 1926, a year of industrial trouble in which the output was only 3 per cent. greater than in 1925. I do not see any justification for assuming a given percentage increase. The correct procedure is to consider the various factors and, from them, to assess the future output as closely as may be. The lower curve of fig. 4 does not take into account the output of any private or non-statutory plants, but an estimate can be made of their output for 1924 from the Census of Production. Adding this figure, we obtain a known point on the upper, or "total output," curve of 10,400 million units for that year; from 1928 onwards we launch out into pure speculation.

The approximate allocation of the 1924 output, as between different users, is shown on the left in fig. 5. Power, apart

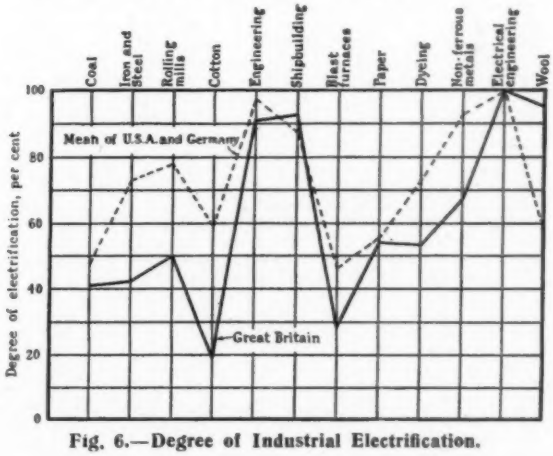



**Fig. 6.—Degree of Industrial Electrification.**

from traction, accounts for about 71 per cent., and lighting, together with other domestic uses, for only about 10 per cent. The annual statistics, however, show that the amount used for domestic purposes is increasing more rapidly than that used for power, so that the lighting load (domestic, commercial, and industrial, together with the domestic power load,

* Nearly three-quarters of the total output of electrical energy is absorbed in meeting industrial and commercial requirements.

would seem to offer the greatest relative scope for expansion; it is, moreover, much less affected by periods of bad trade than is the power load. The number of electrically-equipped houses represents about 20 per cent. of the total number, compared with a reputed 60 per cent. in the United States and 45 per cent. in Germany. Although the number is at present increasing by about 25 per cent. each year, there is still plenty of room for expansion. If every year the numbers built and connected to the mains continued as during the last year or two, the number of electrically-equipped houses would in 10 years' time represent from 55 to 60 per cent of the total; but it is not only to the number that we should look, it is in the more extended use of electricity by each household that there is so much room for expansion.

From the point of view of output, the industrial power load must remain the most important, representing at the present time more than two-thirds of the whole. To compare the "degree of electrification" (*i.e.*, the ratio of electric to total installed horse-power), in fig. 6 are collected figures showing the estimated percentage electrification in a number of important industries in Great Britain, Germany, and the United States. The degree of electrification in Germany and the United States is much the same, so that for convenience the average of the two has been plotted. The industries are arranged according to the total quantity of motive power installed, the largest users being on the left. In spite of the depressed state of the coal industry and of the relatively low degree of electrification in the iron and steel industries, about 40 per cent. of all the electric motors installed are used in connection with these industries. Consequently, whenever a revival takes place in them a considerable increase in output will follow.

The degree of electrification for the country as a whole is as follows: Great Britain 48 per cent., Germany 67 per cent., United States 73 per cent.

In spite of the fact that the degree of mechanisation in this country is in general less than in either Germany or the United States and must presumably remain so, owing to the much smaller home market open to our manufacturers, it still seems reasonable to anticipate an expansion during the next 10 or 12 years of well over 100 per cent. in the electrical power consumed by industry. It is difficult to assess the future agricultural demand, but it is noteworthy that in Germany the total mechanical power used per acre is more than double ours, and that nearly 80 per cent. of it is electric. In this country, in common with France and Germany, less than 2 per cent. of the whole main railway mileage is at present electrified, so that there is an enormous potential demand for electric power. At present nearly half of the country's output of electricity is generated by private plant.

### Conclusions.

All things considered, in 12 years' time the country should have a total output of 28,000 or 29,000 million units, or nearly 600 units per head of the population, indicated by the upper curve in fig. 4, the probable allocation between various users being indicated on the right of the curve.

In arriving at these conclusions, I have assumed, first, that effective steps are taken to popularise and extend the use of electricity; secondly, that the national scheme fulfils our expectations (I will not say the expectations of the man in the street); and, thirdly, that no awkward kinks are imposed upon the curve, such as were caused by the industrial troubles of 1926.

Do not, however, imagine that we need only fold our hands and hope for the best, the industry has a commodity to sell, and nothing sells itself. It has always been a matter of surprise how little the supply side has had to trouble itself about seeking out a market for its goods. In other branches, highly organised sales departments have proved essential, whereas in the Elysian fields of the supply business customers come clamouring for a supply, sometimes only to be sent empty away.

# Problems of Electricity Supply.

## In view of the pending change-over from local generation to bulk supply, generating-station engineers should be trained for other duties.

By W. J. BACHE, M.I.E.E.

(*Abstract of Chairman's Address to the* WESTERN CENTRE *of the* INSTITUTION OF ELECTRICAL ENGINEERS *at Bristol.*)

IT is evident that the national reorganisation of electricity supply must continue to occupy the attention of the supply industry for some time. It would appear that the number of generating stations to be superseded ultimately will now be less than was at first suggested; but still the number will be large, and it may be of interest to consider some of the results which may be expected to follow the closing of a large number of generating stations.

The removal of generation from the majority of undertakings should prove beneficial to the consumers, always assuming that the undertakings are not financially prejudiced thereby; for all the labour, skill, and capital now expended on generation will then be devoted to distribution, salesmanship, and service, and the other duties involved in affording a public supply.

The generation of electricity lends itself so readily to methods of cost-keeping and analysis, and comparative data are so readily accessible, that production processes and costs have been minutely studied, and the cost of generation of electricity has reached a level where further material reductions are only possible by the concentration of generation in capital stations equipped with large generating sets and highly developed steam-raising plant. The process of distribution, on the other hand, does not lend itself so easily to measurement and to analytical methods of costing, but with the increased attention it will obtain in the future it may become possible to apply to it some of the methods which have proved so successful in reducing generation costs, and it is probable that the high proportion which distribution bears to the whole cost of giving a supply will be reduced by improvements in materials and methods. The "standard form" in which all undertakings are required to keep their accounts might be improved by differentiating between expenditure, both for labour and for materials, incurred purely in maintenance and repair of mains, motors, meters, and transformers, and that which, while not strictly chargeable to the capital account, is in the nature of new or replacement work.

The question of sales and service is another instance where the dissemination of data and information would be of benefit all round. A standard form of revenue account covering the sale of fittings has been prepared by the I.M.E.A. in conjunction with the Institute of Municipal Treasurers and Accountants; it is hoped that, in the interests of uniformity, this form, which provides all the particulars prescribed by the Commissioners, will be generally adopted.

The present satisfactory slope in the upward curve of expansion is due in great part to the activities of the Electrical Development Association in educating the public, but much remains still to be done, and the Association can only progress in proportion to the support it receives from all branches of the industry. Electrical refrigeration has recently been studied more closely, and the report of a conference convened by the Electricity Commissioners shows the great possibilities of rural supply. The number of farms in Great Britain taking a supply of electricity at present is about 2,500, with an average consumption per farm of about 1,100 units per annum, a total consumption of under three million units a year; but the total number of farms of 50 acres or more existing throughout the country exceeds 166,000. At present the use of ultra-violet radiation is practically confined to the medical profession, but already makers are producing lamps suitable for use in the home, and when the benefit of artificial irradiation is better appreciated and the correct dosage and treatment are better understood, there is no reason why the morning light bath should not become a general matter of routine. The consumption of energy by an average family for this purpose alone may be about 100 units a year, and when ultra-violet treatment becomes only half as general as wireless reception is to-day, its aggregate consumption throughout the country may be well over 100 million units a year. Though broadcasting is only five years old, there are to-day upwards of two and a half million receiving sets in use in Great Britain. It is quite apparent then that extensive developments must be anticipated not only in the existing, but also in new, applications of electricity, and undertakings which are relieved of the duties and responsibilities of generation will find in them occupation for some of the staff displaced by the change.

This question of displacement of staff requires careful study if injustice is to be avoided. The engineers and workmen who have served undertakings efficiently and loyally are entitled not only to just, but even to generous treatment, when, through no action of their own, and for the benefit of the nation, their normal occupation is discontinued. It must be remembered that their training and experience have been along special lines which do not qualify them readily for absorption in other industries. It can hardly be supposed that a prosperous industry will permit a relatively small and transient financial burden to interfere with just and honourable conduct.

The National Joint Board and National Joint Industrial Council for the Electricity Supply Industry have passed resolutions referring to the question, but so far no practical steps have been taken. It appears to me that preliminary study of the matter should commence now, if only to the extent of considering the probable numbers likely to be affected, the possibility of re-absorption of displaced men in their own undertakings, the extent to which transfer to other localities may be called for, and the methods to be adopted where transfer is indicated.

There are about 570 undertakings in England, Scotland, and Wales, and the total number of generating-station engineers to be displaced and provided for may be taken at about 1,200. If this estimate be correct, it should not be very difficult to provide employment for the displaced technical men amongst the 570 undertakings, though it will perhaps require some goodwill and a spirit of reasonableness on both sides.

The new entrant's prospect of advancement in this branch of the industry will not be very good; students should therefore look rather to the other branches of electrical work for their vocation, and should not be misled by the present prosperity of the electricity supply industry into overestimating their chance, at the moment, of obtaining suitable employment in it. The specialised knowledge and experience obtained by generation engineers, which renders them of value as such to their employers, does not necessarily qualify them to be equally useful and valuable as distribution or commercial engineers, and if they wish to be absorbed in other departments they must themselves take some steps to obtain the knowledge necessary to enable them to undertake different duties. There are many books on a variety of practical and special subjects, besides many helpful and instructive articles in the technical Press, but reading alone, without thought and consideration, will not greatly increase our knowledge. If we train ourselves to think in a logical and systematic manner, our reading will become a fruitful method of study; but the engineer who wishes to qualify for transfer to different work must not rely on book knowledge alone, even if it be supplemented by reflection and understanding. He must study and observe the practical processes of the work he would take up, and here his chief engineer can help him by affording him facilities to become acquainted with the work of other departments. Granted that central-station work is no picnic and that the average charge engineer has a pretty strenuous time in running his shift, it is suggested that without making undue demands on his health and strength, he may devote a few hours a week of his spare time, under the special circumstances and for a period, to obtaining wider experience. In my own undertaking generating-station engineers have been offered facilities, at stated hours and during definite periods, to take part in the work of the mains department, including cable laying, substation equipment, meter testing, and installation inspection, and to gain knowledge of the office work dealing with consumers' accounts. The engineers concerned have gladly taken advantage of these opportunities, and it is hoped that when the station is closed in the near future, these men will be qualified to fill such vacancies as a rapidly expanding output may provide. They understand, however, and in fact a little insight into the work of other departments has shown them, that there is much they can and must do in the meantime to justify their selection for these vacancies. The engineer runs his ordinary eight-hour shift, and then during specified hours, from 10 till 12.30, for perhaps four mornings a week, he is attached as assistant to one of the mains engineers, or he works in the office, under proper supervision and subject to the ordinary discipline and routine of the department; but he gets no additional pay, since he is there for his own benefit and is not taking the place of any regular employé. An extension of this method to other undertakings, subject to such modification as each chief officer may think necessary in the case of his own staff, would help to solve the problem of reabsorption. A carefully thought-out scheme of transference to other localities is also necessary, but the point to be stressed is that the present is the time to set these schemes afoot. It would be a mistake to defer their consideration until stations are about to be closed. Men cannot be transferred from one kind of work to another without some preparation.

There is no need to set up any committee of inquiry or any other new body to study the question. Each undertaking might usefully consider its own position, and whether, or to what extent, it can re-absorb its own displaced labour. There exist already, in the District and National Joint Boards and the District and National Joint Industrial Councils, bodies competent to co-ordinate the efforts of individual undertakings, and to arrange the policy of a transference scheme, while the details can be worked out in co-operation with the Government Labour Exchanges, whose accumulated experience and wide organisation are available and will be of great assistance. Therefore all the necessary machinery is at hand and it only remains to set it in motion. It would be a lasting reproach on a prosperous and expanding industry if the continuance of that prosperity and expansion to which we all look forward were secured at the expense and to the detriment of many of its officers and servants who have done their share in raising it to its present flourishing condition.

But when every effort has been made to provide suitable employment for those displaced, there may remain a few who cannot be provided for, and whom the not too generous provision for compensation contained in the Act may leave in serious financial difficulties. Here we shall find the value of the Institution Benevolent Fund. I wish most earnestly to urge every member to realise not only the duty, but the privilege, of contributing to so useful a fund. It has in the past brought help and hope to many members and their dependents who were suffering under the cloud of adversity; whether it will continue to do so depends largely on the efforts of those who, while enjoying the benefits of health and regular employment, give more than a passing thought to their less fortunate brother members. A flourishing Benevolent Fund should not be beyond the capacity of a successful and progressive industry such as ours.

# Communication Efficiency.

By T. J. MONAGHAN, B.Sc. (Eng.), M.I.E.E.

*(Abstract of Chairman's Address to the* IRISH CENTRE *of the* INSTITUTION OF ELECTRICAL ENGINEERS.*)*

THE faculty of speech is an exclusively human attribute, and the power of intercommunication given by it has enabled man to co-operate with man, and thus to harness the forces of nature for the benefit of the race.

It is the ideal of the telephone engineer to be able to give over long distances the special advantages of the personal interview, but that ideal is not capable of fulfilment to-day, though progress towards it has been rapid, especially within recent years.

The two essential engineering characteristics of speech are, of course, frequency and power. The frequencies used in speech are from about 80 to 5,000, and the average energy of an ordinary speaking voice is of the order of 10 microwatts; but the power peaks—which occur in the vowels—are very much higher than the average, and may be taken as of the order of 200 microwatts—the consonants have low energy values. It is found, strangely enough, that although the low frequencies are the ones of high energy content, more than 80 per cent. of the whole energy of speech being contained in the frequencies up to 1,000, yet these low frequencies can be cut off to a quite large extent before the speech begins to lose its intelligibility.

The voice frequency a.c. input power at the sending end of a telephone circuit is round about a milliwatt or two, the voltage being about half a volt. At the receiving end we have in use one of the most sensitive devices known to science, the telephone receiver. At the receiver powers measured in microwatts will, under suitable conditions as to external noise, give intelligible speech, which explains the statement that all the telephones in the world—and there are more than 30 millions of them—could, if suitably arranged, be worked simultaneously by the power necessary to light a 100-watt lamp. It is estimated that the minimum current necessary to energise a good telephone receiver so as to give an audible signal for an attentive ear is of the order $10^{-9}$ ampere, and the amplitude of the movement of the diaphragm at this current is of the order $10^{-8}$ cm.; less than the mean molecular diameter of the diaphragm material. In the ordinary telephone receiver 1 milliwatt gives a very loud sound, a quarter of a milliwatt a loud sound, and, say, a fiftieth of a milliwatt a good audible signal.

Now although the telephone works with such small currents, it is actually a very inefficient instrument from the point of view of its output in sound energy compared to the input of electrical energy. At resonance of the diaphragm this efficiency is of the order of 1 per cent., and off resonance it falls very much below this figure. It will be evident from the figures given that the ear itself must be highly sensitive; actually energies of the order $2\times10^{-10}$ microwatts, *i.e.*, pressure variations of the order of a thousandth of a dyne, will produce an audible signal.

Such quantities as microwatts, $10^{-9}$ ampere and so on are hard to grasp. Dr. Meyer, of Berlin, has recently given some picturesque illustrations of the orders of magnitudes with which we are dealing. He finds that, assuming we could transform sound energy into heat energy with 100 per cent. efficiency, it would be necessary for a man to talk for over a hundred years before he would have given out enough energy to boil the water needed for a cup of tea; and several hundred thousand trombonists working at full pressure are needed to give a sound output equal to one horse-power.

Engineers of the Bell Telephone Company state that if all the repeaters on the New York-San Francisco telephone circuit were omitted, and an attempt was made, by stepping up the power at the outgoing end, to produce conversation of the quality now obtained, it would be necessary to feed in the estimated total world production of mechanical and electrical power. Actually, by feeding in energy at intervals along the line, 15 doses in all, amounting in the aggregate to something like 10 milliwatts, give excellent speech over this 3,000-mile circuit.

It is, I think, particularly fitting that the question of improved communications between man and man should be considered here, because the Institution to which we have the honour to belong exists largely to facilitate intercommunication between electrical engineers. I feel very strongly that the engineer should be more vocal than he is, on matters both technical and non-technical, for by keeping silence he fails to exercise influence that would be good for the world at large. If there is one thing that an engineer really can claim to be, it is an accurate observer of facts. His work is anchored to fact, his tasks are observation, trial, and then definite action as an end or result of the observations. Unless our judgment is right much more often than it is wrong, we are not really engineers, for "He that has more knowledge than judgment is made for another man's use more than for his own." So that on the question of judgment we at least qualify. Freedom from bias is not too easy to obtain, but we may well claim that engineers are, on the whole, better than average in this most important respect.

# The International Illumination Congress.—V.

## The Seventh Plenary Session of the International Commission on Illumination, at Saranac, U.S.A.

(By OUR OWN CORRESPONDENTS.)

YEAR by year progress is recorded in the art and science of illumination, and at the present time development is particularly rapid. Whenever this is the case in any field of work the interchange of information between those who are engaged in either the research, development, or application fields and the agreement by such workers on standards and fundamental principles is a stimulus to sound progress.

The International Commission on Illumination has for many years provided a means for obtaining useful co-operation between illuminating engineers of all nations, and this year the plenary session held in the U.S.A. demonstrated to the full the valuable influence which such a body can have. The meetings took place at Saranac, Inn., a secluded and charming spot in the Adirondack Mountains, from September 22nd to 28th, under the presidency of Mr. C. C. Paterson (Great Britain).

Eleven countries in all were represented at the meetings, and Great Britain supplied the greatest number of delegates of any of the visiting countries; their names and associations were detailed in the ELECTRICAL REVIEW of September 21st. In addition to them, Mr. A. Goddard (Messrs. J. Lyons & Co., Ltd.), and Mr. T. C. Keeley (Oxford University) attended as members of the International Congress, and not as official delegates of the British National Committee. Another delegate, Mr. C. P. Banham (B.T.-H. Co.) had the misfortune to be taken ill during the voyage, and was unable to participate in the Congress.

At the first plenary session, after an address of welcome by Dr. J. W. Lieb, chairman of the Reception Committee, the President reviewed the work of the Commission since the last meeting and, after touching upon the achievements in the various subjects, which were in most cases revealed in detail by the reports submitted by the responsible committees, he mentioned the scheme initiated at the Bellagio meeting of Technical Committees in 1927, for appointing National Committees instead of the Central Bureau as the secretaries for the study of given subjects. It remained for the reports of the Secretariat Committees, the technical papers presented, and the final conclusions reached, to demonstrate the efficiency of the method.

The subject of "Street Lighting," which has long attracted the attention of illuminating engineers, followed directly the close of the opening session. Papers were presented on various phases of the subject; one by Mr. Paterson on "The British Standard Specification for Street Lighting"; a second by Mr. L. Schneider on "The Physiological Fundamentals of Street Lighting"; two others on "Principles of Street Lighting," and "Some Illuminating Engineering Aspects of Street Lighting," by the American Illuminating Engineering Society's Committee; on "The Reflection Characteristics of Road Surfaces," by Mr. A. K. Taylor; and on "The General Condition of Street Lighting in Japan," by the Japanese National Committee. A further paper, coming under the heading of "General Subjects," on "American Traffic Control by Illuminated Coloured Signals," by Mr. C. A. B. Halvorson, was presented at this meeting on account of its connection with street lighting.

Mr. Paterson's paper reviewed and discussed the four principal clauses of the British Specification, *viz.*, Classification, Mounting Height, Spacing Height Ratio, and Illumination, and stressed the advantages of a simple, though possibly incomplete, specification as a beginning. Attention was also drawn to the method of classification on the basis of minimum illumination, and the necessity for regarding this only as a rating, and not as a criterion of excellence of an installation.

On fundamentals, Mr. L. Schneider's paper traced the process of vision in a street back to the primary sensitivities of the eye, and described how objects are seen by silhouette against their background by day as well as by night. Upon these considerations a suggestion was based for a method of appraising street lighting in which the time of braking of a motor-car is a factor in indicating the efficiency of the lighting; but few data have yet been accumulated.

The American statements represented the views of the U.S. Committee on general considerations of street lighting, and gave descriptions of typical installations in the country, as did also the Japanese Committee in its paper on conditions in Japan.

The work described by Mr. A. K. Taylor on the reflection characteristics of road surfaces is important, and if extended should materially assist the work on glare and visibility.

The papers were discussed to some extent, but the bulk of the time was spent on the discussion of the German Secretariat Report, and two additional meetings of the Committee were found necessary in order to obtain agreement on various points. Discussion centred round the adoption of a criterion for the effectiveness of street lighting, and many different views were expressed. The first division of this problem was the measure of the degree of illumination. The British delegation echoed the views which had already been expressed by Mr. Paterson in his paper on the B.E.S.A. specification, and stated that the clause in that specification which rated the installation on the minimum horizontal illumination at the road surface gave merely a rating of the installation, and did not represent a figure of merit. In the opinion of a number of National Committees, however, the average horizontal illumination was the most accurate measure of the degree of illumination, whilst certain of the American delegates considered the factor of lumens per foot run of much greater value. The delegates from this country emphasised the simplicity of minimum-illumination measurements, as compared with those of average, and also the fact that such measurements are commonly taken in a number of installations and are perfectly understood by a great many people. It was stated also that where careful observations had been taken, for example at the recent Sheffield demonstration, it was found that with street-lighting apparatus and installations as usually designed at the present day the minimum illumination did give some indication of the effectiveness of the street lighting. It was interesting to learn that the British Specification had stimulated great interest in the rating of street lighting installations throughout the country, and was already being largely used.

Much discussion followed on the introduction of the subject of planes of reference for illumination measurements, Britain emphasising the value of measurements at street level, and Germany the simplicity of making measurements at a height of one metre. Both discussions ended in an agreement to specify for international comparison of street-lighting installations, in addition to the usual dimensions, the values of average and minimum illumination on the street surface, and, as an important characteristic, the power used in watts or the hourly gas consumption, as well as the emitted flux (in lumens) per unit of area and of length.

For further study the Committee asked for data to be collected on street-lighting installations in various countries and for suggestions for practical tests for glare and for visibility.

Mr. Halvorsen's paper on "Traffic Signals" raised a subject new to the Commission. The paper dealt with many phases of the problem of traffic control by light signals. On the general question of automatic control, the figures given for the cost of the New York installation compared with the cost of employing policemen at street intersections are sufficiently interesting to be quoted:—

"Commissioner Hoyt, of the New York Police Department, recently stated that at the end of the current year there will be in New York City alone 3,000 intersections controlled at an initial cost of $1,000,000. It would have required 6,000 policemen, at a cost of $15,000,000 per year, to accomplish similar results. With the colour-signal control system only 500 men will be employed at intersections where traffic lights are in operation. While the Commissioner points out that it would be impracticable to employ as many as 6,000 policemen on this line of duty on account of the expense of examining, appointing, and training such a number of policemen, nevertheless, it is of interest to learn that the work of so many can be accomplished in a satisfactory manner by so few and such a relatively small investment. He also points out that accidents have been greatly reduced; at the same time vehicular traffic has been speeded up."

The author went on to consider the practical design of installations and the methods of using red, amber, and green light for stop, caution, and go signals and special combinations of colours for pedestrian indications. After detailing the various mounting positions for the units, as for example at the centre of the crossing (pedestal or overhead mounting) and corner mounting with 2- and 4-way indications, the paper

described the systems of co-ordinating the indications at the various intersections. The methods at present in use are the local manual, the synchronised, progressive, and staggered. The first is in effect a more visible traffic officer, but the others are mainly automatic in action. The synchronised system permits economies in the number of signals, but tends frequently to hold up the traffic. In this system all the signals in the main street give the same indication at the same time, and control of the traffic can be obtained without the use of a signal at every crossing. By arranging adjacent signals to give alternate indications—the staggered system—the number of stops can be reduced, but more units are required. The progressive system is the most satisfactory where conditions permit of its use, and in this case the timing of the various signals can be so arranged that traffic proceeding at a given speed may continue practically without interruption.

Details of the peculiar difficulties of right- and left-hand turns were described in the paper, and information was given on the design of the projector units and their optical systems.

A second new subject of great interest was that of aerial navigation. The American Committee, with characteristic acumen, had circulated a questionnaire on present practice in airway lighting; though it was replied to fully by only France, Belgium, and the United States, it formed the basis of a useful discussion, and brought out the points requiring attention in this sphere.

For the lighting of air routes, beacons visible from a considerable distance are required; on the air ports the necessary equipment includes floodlights, wind vane lights, boundary, obstruction, and approach lights. The questionnaire supplied information on the present practice in certain countries, but international comparison and agreement on the various signals to be used is essential if the maximum of safety is to be assured. The Commission considered the subject of sufficient importance to approve the appointment of a Secretariat Committee, and the United States was asked to undertake the task.

The question of the colour of signal indications is an important one in all forms of traffic signalling, and a large measure of agreement was reached on the subject. The report of the British Secretariat touched upon the types of colour standards employed by various countries at the present time, and the methods of their preparation and use; and the Japanese Committee presented a separate report on the same subject. In Great Britain the Board of Trade prescribes the standards of colour for ships' navigation lights in terms of light-limit and dark-limit standard glasses. Spectrophotometric curves, total transmission, and colorimetric data have now been obtained for these glasses, on the assumption of their use with a source having a colour temperature of 2,000 deg. K.—approximately that of a paraffin flame. Similar standards have been adopted by the Ministry of Transport for railway work, and by the Air Ministry for night flying; and standards for a yellow signal have been accepted.

The position in Germany and in Japan and the United States, as shown in the reports, is somewhat similar to that in England, though possibly one set of standards is not universally accepted; but where the transmission curves are given, they indicate a difference in the requirements in the different countries. Drs. M. Dziobek and W. Pirani presented a paper on "The Standardisation of Signal Glasses," which dealt particularly with the application of the Young-Helmholtz theory and colour triangle to the specification of signal colours. Mr. J. Guild's paper on "The Selection of a Suitable Yellow Glass for Railway Signals" described the results of experiments carried out to determine the most suitable range of colour for a yellow signal in order that it should not be mistaken for a white light or a naked paraffin lamp, or be confused with red, and the properties of a suitable glass were given. A contribution dealing with the selection of standards in the United States was presented by Dr. H. P. Gage, and besides giving a good historical survey, contained information on colour standards in use at the present time. The reports and papers were discussed at some length, and, as an outcome, international agreement was reached on a number of items considered to be pertinent to the discussion of a signal light. It was agreed that a filter was most suitably defined by its spectral transmission, whilst the resultant effect was best defined in terms of the Young-Helmholtz theory. On the question of a standard light source, it was agreed that when one was required a source at a colour temperature of 2,360 deg. K. should be adopted.

In connection with traffic lighting, attention must be paid to the reports and papers presented at the meeting of the Committee on "Automobile Headlights." This subject has been under consideration for some time, but owing to the high state of development in most countries, whilst constructional details have improved rapidly, agreement on the best practice to follow has been relatively slow. At this meeting the American Committee presented its Secretariat Report, and papers were read on "The Automobile Headlight and its Standardisation," by Mr. L. B. W. Jolley; "The Divergence of Beams from Parabolic Reflectors," by Mr. J. W. Ryde and Miss Doris E. Yates; "General Considerations on Automobile Headlights, with Special Reference to International Rules," by Mr. P. Bossu; and "Photometric Measurements of Headlights," by the Japanese Committee. The paper by Ryde and Yates is applicable to parabolic reflectors in general, and is of use to all designers of apparatus incorporating such reflectors. Mr. Jolley's contribution applied the results of the above work to the standardisation of a headlight in order that all focusing devices might be eliminated, and so that the effect of manufacturing tolerances might be a minimum. He also advocated the use of a lamp with a linear axial filament, and gave reasons for his preference. The paper by Mr. Bossu, whilst agreeing with the desirability of eliminating focusing devices, advocated the standardisation of the results, and not of the means for obtaining them. The Japanese paper dealt mainly with existing types of headlights and gave details of their performance. The Committee's report, which gave particulars of the headlamp position in various countries, showed considerable divergence of opinion on the best method to be adopted in order to secure compliance with regulations. The American suggestion is to test performance by beam intensity measurements; the French, by illumination measurements at certain distances relative to the automobile; but the British favoured recommendations on reflector and lamp design, and not on the light distribution in the resulting beam. Some committees were of the opinion that the American recommendations for intensity resulted in a beam unsuited to fast driving at night, and agreement on all phases of the subject was therefore impossible at this stage. It was agreed, however, that a fundamental requirement was the arrangement of the constructional details of the headlight so that all focusing devices could me eliminated, and it now remains to be seen if the accumulation of data by the National Committees will enable any further agreement to be reached at the next meeting.

# Light & Heat in Medicine.

### International Conference and Exhibition.

LAST week, from October 29th to November 1st, an international conference and exhibition of light and heat applied to medicine, surgery, and public health, organised by the *British Journal of Actinotherapy*, was held at the University of London. On Monday, October 29th, Sir John Snell, G.B.E., Chief Electricity Commissioner, performed the opening ceremony, and the Conference commenced with an afternoon session under the chairmanship of Dr. E. P. Cumberbatch, papers being read on Actinotherapy, by Dr. W. J. O'Donovan, O.B.E., and on Diathermy, by Dr. F. Nagelschmidt. In the evening and on the following days twelve other papers were read and discussed, several of them relating to apparatus for electrotherapeutics and for the production of ultra-violet rays, whilst others dealt with the uses of light and heat treatment.

The exhibition of apparatus was very comprehensive, and, owing to the nature of the exhibits, gave an impression of brilliancy, many of the stands including lamps for infra-red and ultra-violet radiation, light baths, apparatus for diathermy, and various patterns of X-ray, high-frequency, and general electromedical appliances. Special demonstrations were given of the detection of ring-worm infection with filtered ultra-violet rays (by Dr. A. C. Roxburgh), the irradiation of milk on Dr. Scholl's system, to develop vitamin "D" (British Hanovia Quartz Lamp Co., Ltd.), and the influence on plants of irradiation with a Hewittic quartz mercury vapour lamp (Dr. Marion Delf). The British Electrical Development Association, Inc., had a stand equipped with models and diagrams bearing on the subject of electrical illumination, and the "Vita" Glass Marketing Board showed its glass transparent to ultra-violet rays.

There was a marked tendency towards similarity of design in the many exhibits of mercury-vapour lamps and reflectors, for professional use; arc lamps showed more variety, and the radiant-heat apparatus offered ample scope for originality of treatment. Massage apparatus was shown by Messrs. I. Calvete, Ltd., as well as their usual arc lamps, &c. Messrs. Ajax, Ltd., had a large display of their standard u.-v. apparatus, the "Mercuray" (a low-power mercury vapour lamp fitted with a Vita-glass screen, for use in the home), and their new "Triaraye"—a combined mercury-vapour u.-v., infra-red, and radiant-heat apparatus, all mounted on a common stand with universal adjustments. Messrs. John Bell and Croyden showed various new models of mercury and arc u.-v. lamps, infra-red lamps, a tungsten arc-light bath (fitted with nine arc lamps, on three columns) for hospital use, electric heating pads, &c. X-ray apparatus of new design was exhibited by the Medical Supply Association, Ltd., amongst a variety of u.-v. and other electromedical appliances.

On the stand of the Cox-Cavendish Electrical Co. (1924), Ltd., were many new devices, mainly mercury-vapour and tungsten arc lamps for professional use, a new patent "auto-condensing thermal couch" for the treatment of rheumatism, and apparatus for diathermy and radiant-heat treatment. The Hewittic Electric Co., Ltd., amongst its many patterns of u.-v. ray equipment showed a small water steriliser, and

apparatus for various other industrial uses of the rays. Messrs. Kelvin, Bottomley & Baird, Ltd., devoted most of their space to new apparatus for electro-therapeutic treatments, embracing u.-v. rays, diathermy, radiant heat, and, on the industrial side, water sterilisation and fluorescence tests. A useful emergency lighting system, called the "Keepalite," for automatically changing over to battery lighting in case of failure of the main lighting system in operating theatres, was a feature of the Chloride Electrical Storage Company's exhibit. Philips Lamps, Ltd., showed the "Metalix-portable" X-ray unit, which enables the medical man to practise radiography with safety in the homes of his patients. The U.V. Ray Co.'s chief exhibit was a new quartz mercury-vapour outfit for dental treatment. Other interesting exhibits were staged by Electro-medical Supplies, Bower Electric (1926), Ltd., Stanley Cox, Ltd., the Thermal Syndicate, Ltd., Dowsing Radiant Heat Co., Ltd., L. G. Hawkins & Co., Ltd., Henrion Carbons, Ltd., Rouse & Sons, Ltd., Holophane, Ltd., British Quain Sunlight, Ltd., Sun-vi-lite, Ltd., Bellingham & Stanley, Ltd., and Electrical Equipment & Carbon Co., Ltd.

# New Electrical Devices, Fittings, and Plant.

**Readers are invited to submit particulars of new or improved devices and apparatus for publication in this Section.**

### New Rotary Switches.

The HART MANUFACTURING CO., 76-76B, Rochester Row, S.W.1, is about to introduce a new range of heavy-duty rotary switches which will, it is claimed, cover capacities never before satisfactorily controlled by a rotary snap switch. The new switches will be of attractive design and finish. Each will be equipped with a bakelite shock-proof cover, with indications sunk into the face, showing up in white filling against the black background of the cover. The apparatus has been designed primarily for heavy-duty commercial ranges and water-heating work, and for special uses where long life and rigid construction are essential. The capacities will range from 25 A at 250 V to 45 A, 250 volts, or 45 A, 125 V. All types of single-, double-, and three-pole switches will be available.

### A New E.h.p. Oil Switch-Fuse.

A new type of e.h.p. oil switch-fuse has been recently introduced by Messrs. LONG & CRAWFORD, LTD., Gorton Road, West Gorton, Manchester, to meet the need for a safe and effective method of protecting transformers of up to 1,000 kVA at 12,500 V, and for the protection of branch circuits. The equipment was designed primarily for use on overhead-line systems, and is arranged for pole mounting, although other models are available for indoor use, one of which has been specially designed for use in conjunction with the makers' "Metesco" ring breaker. The apparatus is claimed to be unique inasmuch as it is self-isolating when the switch-fuse portion is lowered, and thus rendered dead when re-fusing is carried out. A switch arm with an accelerated break enables normal switching to take place on load without the unit having to be opened up, the circuit being broken under a good head of oil. The switching operation can be performed from the ground when the unit is mounted on a pole. The unit is so designed that a fixed sequence of operations must take place when re-fusing becomes necessary, ensuring that the circuit is broken under oil before the isolating portion can be operated.

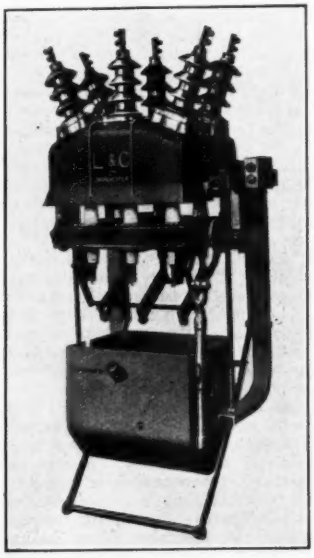


**Fig. 1.—Oil Switch-Fuse; 50 A, 11,000 V.**

The whole operation of fuse replacement can be carried out in two or three minutes; the holders are removable and rewirable on site. Fig. 1 shows a 50-A, 11,000-V outdoor-pattern switch-fuse opened for fuse replacement or inspection. In the open position the tank can be tilted and the oil poured out through a spout. The gear is available in various types for loads up to 150 A at 3,300 V, and 50 A at 12,500 V.

### A New Electric Fire.

The accompanying illustration, fig. 2, shows a new electric fire, the "Elect Handy," recently introduced by the ELECTRIC HEATING CO., George Street, Croydon, which can be easily converted for boiling kettles, plate warming, and so on. A small handle at the side allows the bar to be turned in an upward direction. A copper grill or grid is provided at the top for holding small plates and dishes. The loading is 1,000 W, and the finish is bright art black.

**Fig. 2.—The "Elect Handy" Fire.**

**Fig. 3.—Neon Domestic Indicator.**

### Neon Indicators.

A recent development of Messrs. PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2, is a neon lamp indicator for use primarily in connection with domestic electrical appliances, indicating whether they are in circuit or not. This indicator is small in size, measuring only 55 mm. by 17 mm., and has a very low current consumption (¼ kW). As with the ordinary neon lamp the indicator emits a light which, though subdued, is instantly discernible, both in daylight and strong artificial light, but the heating effect is negligible. One of the electrodes takes the form of a small disk and the other that of a ring. The indicators should also find a field of use as circuit indicators in factories, theatres, and so on, where it is not always possible to quickly ascertain which lamps or groups of lamps are alight by the position of the switches. The indicators are made with bayonet and screw caps for a.c. circuits at 100-250 V, and d.c. at 150-250 V. Fig. 3 shows a b.c. indicator for domestic circuits. For power installations and switchboards a double-ended, 400-650-V, a.c. and d.c., indicator is available.

### A New Insulating Material.

A new insulating material known as "Corox" is referred to in the *Telegraph and Telephone Age* as having a greater insulating value at high temperatures and at the same time higher heat conductivity than mica, asbestos and other materials. A Westinghouse engineer is reported to have said that by virtue of the above properties it is now possible with the material to improve the efficiency of electric heating apparatus by 10 per cent. and increase its useful life by from 200 to 300 per cent. "Corox" is made by a process employing metallic magnesium. The material is apparently the same as that produced in the manufacture of the boiling-plate elements of Messrs. METROVICK SUPPLIES, LTD., described in our issue of June 18th, 1926. Pure magnesium is treated in steam at high pressure, and the oxide so produced is the new insulating material.

### Portable Electric Pumping Set.

With reference to the description of the portable electric pumping set, recently put into commission by the Wakefield Corporation for cleaning out the sewers, which appeared in our issue of October 12th, p. 602, we have been informed that Messrs. BLACKSTONE & CO., LTD., Stamford, in addition to manufacturing the pump, designed, built and supplied the complete set.

### New Automatic Accessories.

Three automobile electrical accessories recently introduced by Messrs. RUNBAKEN MAGNETO CO., Tipping Street, Ardwick, Manchester, include a "Get-You-Home" emergency lighting set designed to be operated by the magneto, the "Warnolite," a tail lamp indicating buzzer, and a "Resonant Circuit" ignition tester which makes use of the resonance in a "tuned" circuit for its testing capabilities.

### A Motor-Car Lamp Cabinet.

The BRITISH THOMSON-HOUSTON CO., LTD., Rugby, has recently introduced a cabinet for the displaying and stocking of "Mazda" automobile lamps. It measures 21¼ in. square by 26½ in. deep when open. It is made of steel and finished in green enamel. There are 40 compartments, each of which will accommodate two headlight or six side, tail, or dash lamps.

# The E.D.A. Programme.

### Plans for the November-June Period.

THE British Electrical Development Association has prepared a carefully-planned programme for the period ending next June. This programme has been set out in calendar form with full details of the methods recommended for ensuring the success of each phase. It forms a basis for a continuous general selling and publicity policy for the whole of the electrical industry, and the Association hopes that supply, manufacturing, contracting and wholesaling branches of the industry will co-operate and direct their publicity during the various periods in accordance with the programme, so that the whole industry may speak to the public throughout the country with one voice.

The programme consists of a series of definite selling and publicity efforts, each one being related to a monthly period as shown in the calendar. During each monthly period the Association will provide advertisements in the national Press; suitable posters; instructions for showroom window layouts, associated with window displays provided free to all members; "Sales Help" handbooks with instructions for arranging demonstrations; drafts of direct sales letters; literature to be issued by supply undertakings, contractors, &c.; layouts and suitable blocks for local newspaper and other advertising in conjunction with the E.D.A. national advertising.

In addition to these activities the E.D.A. will continue to produce and circulate kinema films, lantern slides, and lectures, and will endeavour to extend the general activities of the Association.

The proposed propaganda divides into two parts. First, there is the direct work of E.D.A., *i.e.*, national advertising. This has been based on the idea of carrying a continuous and simple message to the public, designed constantly to remind it of the existence of electricity and the fact that it can be used for many different purposes, the objective being gradually to build up the idea in the public mind that "Electricity can do it," and that every arduous task is made easier by the use of electricity. In order to make the most of the money that will be available it has been decided to utilise small spaces in papers and journals with national circulations, the advertisements being simple and very bold. Secondly, there is the work of supply undertakings, manufacturers, contractors and others, in support of the general idea. It will be the endeavour of the Association, through its Area Committees and Circles, to encourage local supply undertakings and electrical firms to adapt their local Press and other publicity to key in with the E.D.A. programme, and for this purpose to use E.D.A. posters, issue E.D.A. literature, and advertise in the local Press using the layouts and blocks mentioned above These advertisements will carry a more detailed message and bear the name and address of the undertakings or firms employing them.

The appeals will deal with the following:—November, Electric Heating; December, Electrical Christmas Presents; January, Domestic and Colour Lighting; February, New Installations and Wiring, associated with Spring Cleaning; March, Labour-saving Appliances, associated especially with Wash Day; April, "Mid-season" Heating; May, Electric Cooking; and June, Refrigeration and Fans.

The Association's national advertising will appear in sixteen newspapers and journals, and there will be a total of 212 advertisements.

In addition to the foregoing, other activities of the Association will be further developed. Sub-committees are engaged upon special subjects, *e.g.*, rural electrification, industrial heating, refrigeration, &c. The E.D.A. Exhibition Sub-Committee is organising an exhibit at the Newcastle Exhibition, and is also exploring the possibilities of organising a National Electrical Exhibition. It is also hoped to develop extensively the Association's kinematograph film service.

A new folder "To help you choose your Xmas Presents," a model Christmas window display, and a series of "local" advertisements have been prepared, and will be available immediately for use in connection with the December part of the programme. Matrices or stereos of the local advertisements, pierced for the insertion of the user's name and address, will be available at cost price.

We have also received a list of E.D.A. publications classified under various headings, the price per thousand being given, although they can be obtained in smaller quantities *pro rata*.

# Legal.

### Celebrity Gramophones, Ltd., v. Celebritone, Ltd.

A SETTLEMENT was announced to Mr. Justice Clauson in the Chancery Division on October 31st, of the motion and action by Celebrity Gramophones, Ltd., against Celebritone, Ltd., which had been adjourned from October 26th.

Mr. W. F. SPENS, K.C., for the plaintiff company, said they had come to a satisfactory arrangement under which certain undertakings and other terms had been granted to his clients. The defendant company would continue to trade in its own name. The essential difference between them was that the defendant company was marketing a gramophone embodying an electrical apparatus, while the plaintiff company marketed ordinary gramophones. But the plaintiff company's trade was being amply protected by the undertakings and other concessions given to them. All that he was asking, therefore, was a stay of all proceedings on the terms agreed.

His LORDSHIP assented.

### Accumulator Manufacturer Fined.

AT Halifax Police Court, on October 30th, Clement T. Rhodes, accumulator maker, was fined £1 on each of five summonses for breach of the Accumulator Regulations Act, 1925. He was charged with failing to make provision for efficient exhausts, to provide a health register where lead was burnt, to have new employés medically declared as fit for the work, and to provide suitable overalls, waterproof aprons, and footwear for the workers.

# Correspondence.

***Correspondents should forward their communications* as early as possible.** ***No letter can be published unless we have the writer's name and address in our possession.***

### Damage to Consumers' Apparatus.

We should be glad if any of your readers could give us any helpful advice in connection with the following:—

About twelve months ago we supplied one of our clients with a d.c. quartz burner, and about a month or so ago, due to some mains trouble, the polarity of his house was reversed, with the result that the burner was destroyed. The supply authorities deny responsibility, because they were not notified of its installation.

We, as registered contractors, know how utterly impossible it is to notify the supply authorities concerned of every article which is sold; for instance, the big stores sell irons, vacuum cleaners, and all manner of domestic electrical apparatus, which we all know are not notified—in fact, we should have to engage more staff, if every sale meant a letter of notification to the particular supply authority concerned.

Perhaps some of your readers may have had similar experience and could give helpful advice.

**E. O. Walker & Co., Ltd.**
(E. O. WALKER, *Director.*)

Manchester, *October 27th*, 1928.

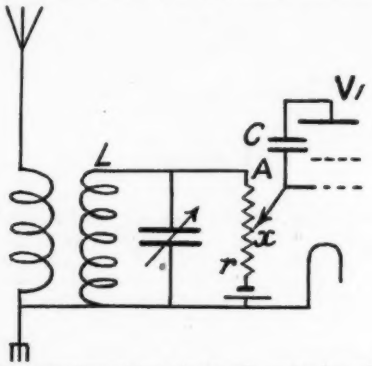
[The article by Mr. W. Eric Jackson in our issue of October 12th, and the letter by Mr. H. M. Sayers in our issue of October 19th, should be of use to our correspondent.—EDS. ELEC. REV.]

### Radio Receiver Volume Control.

The problem of controlling the output from a radio receiver has been treated by Mr. A. B. Whittaker in an interesting article in your issue of October 26th. In any receiver for broadcast reception, it is essential, when working on the local station, that the voltage applied to the detector or rectifying valve should lie between certain limits. This ensures the minimum of distortion due to the rectification of the h.f.

modulated carrier wave. If the volume control is in the l.f. amplifier it is easy to overload the detector when all the h.f. circuits are in tune with the local station. Detuning alters the quality and invites interference. *Thus the volume control should precede the detector.* Mr. Whittaker cites several useful methods of doing this, including the well-known process of dimming the h.f. filament.

As an alternative scheme, the method used by the writer in a new type of 4-3-5 (tetrode, triode, pentode) receiver known as the "Megavox," may be of interest. The arrangement is shown below. A potentiometer r of 0.5 megohm is connected across the secondary of a low-loss aerial transformer.




r=0.5 meghom potentiometer (not wire wound) L=low loss coi, 27/42 wire.
c=fraction of a mic o-m'crofarad. V =screened h.f. valve (tetrode).

**Diagram showing volume control used in the "Megavox."**

The slider goes to the grid of the h.f. valve, in this case a tetrode, so that any desired fraction of the h.f. voltage can be applied to the valve. This method ensures that the h.f. circuits shall always be in tune however near the receiver may be to the local station: also that the effective dynamic resistance of the tuned circuit shall not exceed 0.5 megohm. This makes for stability at the shorter wave-lengths, and is useful when the h.f. valve is of the screened variety (tetrode). Since the portion Ax is in series with the grid-to-anode capacity C, it damps out any tendency to oscillation due to feed back from the anode circuit through the valve. By using a small amount of resistance Ax, the tetrode can be prevented from oscillating, whilst the detector (next valve) can be used as a heterodyne oscillator for searching without re-radiation. If it is desired to preserve the detector input at a definite value whilst obtaining a weak loud-speaker output from a nearby local station, it is essential to incorporate a control in the l.f. as well as the h.f. amplifier.

**N. W. McLachlan.**

London, *November 2nd*, 1928.

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### Hot-Spot Temperatures.

Being responsible for the anti-hot-spot transformer advertisements to which Mr. E. T. Norris's letter in your issue of October 26th takes exception, we welcome the opportunity of replying in terms which will not be accused of vagueness.

In the first place, extraordinary though it may seem to Mr. Norris, others than himself have written on heat transference from electrical windings, and it was more particularly American experiments—which bear out our claims—that we had in mind.

Really, Mr. Norris's kindergarten lesson on thermal transference is an insult to the intelligence, it being perfectly obvious, without his ponderous proof, that a body which is losing heat must be hotter than the body to which it loses heat, and, therefore, the maximum temperature in a properly constructed transformer will be in the active Stalloy or copper.

The important fact in the whole letter, and that to which we draw particular attention, is that Mr. Norris very skilfully evades the whole point at issue, and, instead of facing facts, adopts the common political expedient of setting forward an argument which no one propounded, so that he may demolish it with great *éclat*.

The anti-hot-spot advertisement in no way states or implies that there is no maximum temperature in our transformers, but that they are designed without hot spots. Words mean what they are generally taken to mean, and the meaning of the commonly-used expression "Hot Spots" in electrical windings is—definitely localised positions where abnormal heating is experienced in relation to the remainder of the material performing similar functions. In other words, quite explicitly, a hot spot is an abnormality occurring in an otherwise smooth temperature gradient curve. A hot spot is due to faults in design or workmanship, which cause a dangerous local temperature under normal loading conditions. The indicator which Mr. Norris favours does not, and cannot, measure or indicate it.

It is possible to eliminate hot spots in a well-designed and properly constructed transformer, and the advertisement is quite accurate in saying so. It is also correct to say, and we repeat it, that hot-spot indicators are an anomaly, since they imply something which should not exist, and which they do not indicate when it does exist. All that a hot-spot indicator can give is given equally well by an ordinary mercury thermometer.

In a pamphlet for which one assumes Mr. Norris has some responsibility, it is stated: "Measurement of the hottest oil temperature is, therefore, no indication of the value of the winding gradient, or of the hottest spot temperature, and is therefore meaningless as an indication of the true loading of the transformer." We claim that the hottest oil temperature is a very satisfactory indication, and the experience of engineers generally since oil-immersed transformers came into use bears us out. There is such a thing as "factor of safety," but apparently Mr. Norris believes in screwing down the safety valve. If a hot-spot indicator allows a transformer to be run with the oil above 90 deg. C., then it encroaches on the margin of safety in a dangerous manner. In a time of dire emergency an engineer may consider the risk of running at a temperature in excess of 90 degrees worth while, but under normal conditions this temperature is seldom, if ever, reached, so the extra cost of the indicator over a thermometer is wasted.

There is possibly one case where it may be desirable to use a hot-spot indicator. If a transformer is used working at abnormally high densities in the iron, and abnormal densities in the copper, so made to cut the weight of material and the cost down to the lowest possible figure, it may be useful to have a hot-spot indicator fitted so that, after a short and merry life, the engineer may be warned that the transformer is no longer capable of carrying its rated capacity without danger, but, alas! even here it fails, for it works to a formula and not to a fact. In any case, although a cut-down and over-rated transformer may survive its twelve months' maintenance period, during which it may be lightly loaded, it will not give long service when its full duty is being required of it.

One other point: The "British Standard Rating" was formulated so that engineers could readily make comparisons between the offers in different firms' tenders and for tests at makers' works, and was not intended as a basis of maximum loading.

The figure of 90 deg. C. has for long been the test of how much load to put on any individual transformer, and is accepted as a reasonable figure by the vast majority of users, who are unlikely to accept Mr. Norris as an over-riding authority.

**Hackbridge Electric Construction Co., Ltd.**
(W. C. Kennett, *Technical Director.*)

Walton-on-Thames, *October 30th*, 1928.

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### Heat Dissipation in Cables.

With reference to the article contributed by me in your last issue, critics will no doubt take exception to the high price put forward for the overhead line.

I may say that at the time the article was put together I had no data of recent prices for overhead lines, but information has since appeared from which it would seem that the Government has paid a sum of the order of £1,700 per mile of single-circuit line.

Expressed in terms of a ring main and bearing in mind that the capacity of the ring main is only the capacity of *one half* of the double circuit, when the other half has broken down, it will be granted that we have to take the cost of both halves, namely, £3,400 per mile, and divide this by the capacity of one half-line, *viz.*, 50,000 kW, which gives us a figure of roughly £.068 per mile, per kW.

The figure I have taken is £.060. Hence, after all, apparently no injustice has been done to the overhead line.

Moreover, the figures show that even on these prices the fixed charge on the overhead line is substantially *double* that of the underground cable. I thought it advisable to mention the above, because the natural tendency is to get at the cost per mile per kW by dividing the cost of *one half* of the ring main by its power-carrying capacity.

**A. M. Taylor,**
*Major, S.O.2.*

Erdington, *October 31st*, 1928.

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### The Training of Apprentices.

I have read with interest Mr. Alexander Milne's letter in your issue of to-day. I should like to call to the writer's attention that the N.F.E.A., the E.T.U., and also Joint Industrial Councils have been discussing this vexing problem of social welfare for some years. If it is possible for the A.S.E.E. to do what the above powerful combination has failed to do—"Hats off" to the A.S.E.E.! During my 20 years' experience of contracting I have found that the worst offenders are big concerns; the apprentice under the small contractor does not get "the sweeping out the shop term" or the "two years' screwing tube term," but he does get a varied experience of anything which comes into the shop. In my opinion the only remedy is the abolition of the indenture system.

**R. Pope.**

Kennington Park, S.E.17, *November 2nd*, 1928.

### Electromagnetic Forces.

Your correspondent's, Mr. W. F. Dunton, original criticism and example referred specifically to the case of a circuit breaker crossbar. We have not incited anyone to attack such a problem by formulæ applying only to parallel conductors, and our previous criticism holds. Mr. Dunton now diverts his criticism to another formula, but the same answer applies in substance.

Your correspondent clearly required no warning himself to prevent misuse of the information we gave, and we know of no one else who did.

Mr. Dunton's own work contains useful detail not formulated by us, but he is in error in supposing that it discloses anything new in principle and not previously taught or not known to us.

**E. B. Wedmore,**
**H. Trencham.**

London, *November 2nd*, 1928.

### The Central Electricity Board's Contracts.

Rumour has it that certain of the Central Electricity Board's contracts are to be carried out under the supervision of engineers of foreign nationality. It is to be hoped that the Board will see that the clauses in the Conditions of Contract relating to British material and workmanship are properly complied with. There are really capable and experienced British engineers who would be only too pleased to put their heart and soul into this national work, and there is no necessity to go abroad for staff.

Your readers would no doubt be interested to see some authoritative statement on the subject.

**Pollux.**

London, *November 5th*, 1928.

[We trust that the rumour referred to is without foundation; the National Electricity Scheme should be truly national throughout.—EDS. ELEC. REV.]

# Published Specifications.

**Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged and all subsequent proceedings will be taken.**

#### 1927.

12,328. "Alarm circuit systems, particularly fire alarm signalling systems." G. C. Snyders, C. Gordyn, jun., J. Van de Kamp and C. E. A. Maitland. May 8th, 1926. (270,755.)

12,627. "Reception of radio signals." J. L. Baird and Baird Television Development Co., Ltd. May 11th, 1927. (298,582.)

17,857. "Overload-responsive switches." British Thomson-Houston Co., Ltd., and H. C. Heath. July 5th, 1927. (298,549.)

17,964. "Telephone lines with amplifiers." Siemens & Halske Akt. Ges. July 7th, 1926. (274,088.)

18,089. "Manufacture of white lead by electrolysis." R. S. Carreras. July 7th, 1927. (298,520.)

18,230. "Electric switches." Butlers, Ltd., and A. Reeves. July 8th, 1927. (298,506.)

18,540. "Electromagnetic relays." Automatic Telephone Manufacturing Co., Ltd., and G. Rossell. July 12th, 1927. (298,590.)

18,547. "Transformers." S. G. S. Dicker (Naamloose Vennootschap Philips' Gloeilampenfabrieken). July 12th, 1927. (298,591.)

18,774. "Combined electric switches and voltage regulators." R. Bosch Akt. Ges. January 20th, 1927. (283,912.)

18,805. "Electric signalling systems." Siemens Bros. & Co., Ltd., D. A. Christian and D. P. Long. July 15th, 1927. (298,677.)

18,815. "Electric protective systems." A. Reyrolle & Co., Ltd., and R. W. Biles. July 15th, 1927. (298,678.)

19,058. "Insulating materials." A. R. Kemp and Western Electric Co., Inc. July 18th, 1927. (Addition to 246,663.) (298,694.)

19,065. "Electric heaters." O. L. Peard and A. F. Harrison. July 18th, 1927. (298,695.)

19,274. "Electric switches." Siemens Bros. & Co., Ltd., and F. Baker. July 20th, 1927. (298,701.)

19,385. "Electrical resistances." Igranic Electric Co., Ltd., P. W. Willans and L. E. Curran. July 21st, 1927. (298,703.)

19,736. "Insulating material for electric condensers and the like." J. E. G. Lahousse. August 15th, 1926. (275,958.)

20,182. "Electrode structures for thermionic valves." British Thomson-Houston Co., Ltd. and L. J. Davies. July 29th, 1927. (298,715.)

20,565. "Electrostatic devices for the interconversion of mechanical and electrical oscillations such as condenser telephones." British Thomson-Houston Co., Ltd., and R. C. Clinker. August 4th, 1927. (298,719.)

20,731. "Electric motors." B. G. Williams. August 5th, 1927. (298,722.)

21,090. "Electric switchgear." E. Dobson. August 10th, 1927. (298,724.)

21,093. "Electrical driving-mechanism for gramophones and the like." W. Rebikoff. August 10th, 1927. (298,725.)

21,696. "Electricity meter and method of assembling same." H. E. Angold and Smith Meters, Ltd. August 17th, 1927. (298,732.)

21,728. "Electrical plug, fuse, switch, and the like contact-blocks or the like." W. E. Amies. August 18th, 1927. (298,733.)

22,070. "Thermionic valve circuits." T. F. Stent and Edison Swan Electric Co., Ltd. August 22nd, 1927. (298,737.)

22,683. "Accumulator cases for miners' electrical lamps." W. Gosmann and Concordia Electrizitäts Akt. Ges. August 29th, 1927. (298,744.)

23,025. "Party-line telephone systems." Hasler Akt. Ges. vorm. Telegraphen-Werkstatte Von. G. Hasler. July 16th, 1927. (294,095.)

23,112. "Electromagnet." Schild & Co. September 3rd, 1926. (277,020.)

23,819. "Telephone instruments and particularly loudspeakers." A. J. Stevens & Co. (1914), Ltd., and H. C. Willson. September 10th, 1927. (298,751.)

26,798. "Electrical discharge devices." Westinghouse Electric & Manufacturing Co. November 19th, 1926. (280,870.)

26,954. "Moving-coil electrical instruments." W. Holmes and Ferranti, Ltd. October 11th, 1927. (298,768.)

28,173. "Railway and tramway points or switches." S. S. Wrightson and C. R. Matthews. October 24th, 1927. (298,777.)

28,231. "Synchronoscopes." British Thomson-Houston Co., Ltd. October 25th, 1926. (279,507.)

28,254. "Telephone instruments." H. Wade (T. F. Hire). October 24th, 1927. (298,779.)

29,350. "Protection of electrical circuits." General Electric Co., Ltd., and H. J. Coates. November 3rd, 1927. (298,785.)

30,342. "Thermionic valves." La Radiotechnique. December 10th, 1926. (282,028.)

30,536. "Method of and means for connecting recording apparatus to electric lines." Siemens-Schuckertwerke Akt. Ges. November 13th, 1926. (280,911.)

30,568. "Apparatus for use in cooling bodies maintained at high electric potentials." S. R. Mullard (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). November 14th, 1927. (298,791.)

32,672. "Sparking plugs." G. T. Wilson. December 3rd, 1927. (298,803.)

33,625. "Electric incandescent lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 11th, 1927. (285,069.)

34,604. "Transmission systems with amplifiers." Siemens & Halske Akt. Ges. June 15th, 1927. (292,136.)

34,787. "Electric advertisement signs." G. Norenberg and M. Sund Hansen. December 22nd, 1927. (298,816.)

35,215. "Loudspeakers for wireless installations." W. Reed Lethbridge. December 29th, 1927. (298,818.)

35,309. "Multiple contact fields for selectors in automatic telephone systems." L. M. Telefonaktiebolaget Ericsson. January 5th, 1927. (283,153.)

35,310. "Selector switches for automatic telephones." L. M. Telefonaktiebolaget Ericsson. January 5th, 1927. (283,154.)

35,397. "Frequency-responsive electrical apparatus." Metropolitan-Vickers Electrical Co., Ltd. January 3rd, 1927. (283,113.)

#### 1928.

2,131. "Suspension devices for electric lamps." K. Tettschlag. February 1st, 1927. (284,621.)

2,705. "Photo-electric cells." De Forest Phonofilms, Ltd. January 29th, 1927. (284,342.)

3,046. "Switching of stationary dry surface contact rectifier cells to a voltage divider." Siemens-Schuckertwerke Akt. Ges. February 2nd, 1927. (284,651.)

3,460. "Electromagnetic device permitting the practical realisation of television." L. Thurm. February 5th, 1927. (284,717.)

3,697. "Connectors for electrical circuits." B. E. Barrett. February 6th, 1928. (298,834.)

4,514. "Variable electric condensers." Compagnie Générale de Télégraphie et de Téléphone. February 15th, 1927. (285,410.)

4,821. "Lighting devices." Holophane, Ltd., and S. English. February 15th, 1928. (298,839.)

5,231. "Illuminating bodies." C. Zeiss (firm of). March 2nd, 1927. (286,265.)

5,881. "Manufacture of metal containers for cells of dry batteries." Elektrotechnische Fabrik Schmidt & Co., Ges., and O. Tannert. February 24th, 1928. (298,844.)

6,729. "Sparking plug for explosion motors." H. De Ruyter. March 15th, 1927. (287,107.)

10,696. "Motor vehicle head lamps and the like." R. W. Walkey. May 29th, 1928. (298,866.)

11,316. "Locking devices for electric lamp bulb supports of direction indicators." A. R. P. Johnson. April 17th, 1928. (298,870.)

12,248. "Fine-adjustment mechanism for rotatable members of electric tuning devices." British Thomson-Houston Co., Ltd. June 6th, 1927. (291,728.)

12,361. "Manufacture of incandescent electric lamps." British Thomson-Houston Co., Ltd. April 29th, 1927. (298,478.)

16,272. "Relay for regulating apparatus." Akt. Ges. der Maschinenfabriken Escher Wyss et Cie. July 12th, 1927. (293,790.)

16,616. "Electromagnetic brake-shoes for railways." Ges. für Oberbauforschung. June 10th, 1927. (291,798.)

17,160. "Process of electrolytically refining antimony." Norddeutsche Affinerie. July 18th, 1927. (294,143.)

18,375. "Electrical transformers." Koch & Sterzel Akt. Ges. August 4th, 1927. (295,014.)

20,740. "Thermionic valve circuits." British Thomson-Houston Co., Ltd. July 22nd, 1927. (294,250.)

22,982. "Pantograph current-collectors." British Thomson-Houston Co., Ltd. August 12th, 1927. (295,392.)

# Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 31st:—

Maglita. No. 491,822. Class 6. Magneto-electric machines for lighting purposes and ignition devices for use on motor vehicles.—C.L.I. Manufacturing Co., Ltd., 116, Colmore Row, Birmingham.

Eldurator. No. 491,912. Class 8. Electric accumulators (not for medical purposes).—Poersck Elektricitäts Gesellschaft, Charlottenburg, Germany. (British representatives: Chatwin & Co., 253, Gray's Inn Road, W.C.1.)

Elimeter. No. 492,446. Class 8. Electrical measuring instruments for use with battery eliminators.—Sifam Electrical Instrument Co., Ltd., Bush House, Aldwych, W.C.2.

New Level (lettering and design). No. 493,412. Class 8. Electric batteries (not for medical purposes).—J. Watson trading as Watson's Wholesale Wireless, 2, Bigg Market, Newcastle-on-Tyne.

Perfectavox. No. 493,954. Class 8. Instruments consisting of a combination of radio-telephonic receiving sets and gramophones.—E. N. Kent-Lemon, 30, Park Cross Street, Leeds.

Iscphone. No. 495,055. Class 8. Sound transmitters and loud speakers.—Louis Lumière, Neuilly-sur-Seine, France. (British representatives: Abel and Imray, 30, Southampton Buildings, W.C.2.)

Igranikit. No. 494,923. Class 8. Instruments and apparatus for use in radio-telephony and telegraphy.—Igranic Electric Co., Ltd., 147, Queen Victoria Street, E.C.4.

SS (lettering and design). No. 461,920. Class 13. Electric switches and fuses.—Siemens-Schuckertwerke Gesellschaft, Berlin. (British representatives: Haseltine, Lake & Co., 28, Southampton Buildings, W.C.2.)

Candelux. No. 492,783. Class 13. Electric lamps (ordinary).—British Electric Lamps, Ltd., Spencer Hill Road, Wimbledon, S.W.19.

Fosalil. No. 494,261. Class 50. Electrical insulating substances and materials.—Moler Products, Ltd., 8, Old Jewry, E.C.2.

# New Work for Contractors.

**Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.**

***Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.***

ANNAN.—School (£4,396), for Dumfries-shire E.C.; clerk, Dumfries.

AUDENSHAW.—Foundry extensions; General Gas Appliances, Ltd.

AYLESHAM (Kent).—Cinema; A. D. Levy, manager of the Wellington Cinema, Dover.

BARNES.—Secondary school for girls (£31,950), East Sheen, for Surrey E.C.; W. W. Finny, secretary, Kingston-on-Thames. New Lowther school (£14,746), for Surrey E.C.; H. Ham, builder.

BARNSLEY.—School at Cundy Cross, for Borough Education Committee; Dyson, Cawthorne & Coles, architects, 10, Regent Street. (November 19th.)

BEDDINGTON AND WALLINGTON.—Houses (40), High View Estate, for T. Markwick & Co. Houses (48), Godalming Avenue, for G. Fergusson.

BOLTON.—Rebuilding of premises, 7-9, Bank Street; for John Crook (Bolton), Ltd. Fish and retail markets; borough engineer.

BOOTLE.—Roman Catholic school (400 places), Wadham Road; managers.

BRADFORD.—Electric lighting installation, 10 combined shops and houses at Eccleshill and Shirley Manor housing schemes; city architect, Town Hall; tenders to N. L. Fleming, town clerk.

BRISTOL.—Block of flats, Lawford's Gate, for the T.C.; L. S. McKenzie, Council surveyor (returnable deposit of £1).

BUCKDEN (Huntingdon).—Electric light installation, Union Baptist Church; secretary.

CARLISLE.—School centre, Nicholson Street (£4 000); Education Committee. Fire station reconstruction and accommodation for firemen; Watch Committee and borough engineer.

CHELMSFORD.—Art school extensions (£28,000), for Essex E.C.; county architect, Chelmsford.

CHELTENHAM.—Warehouse and milk depôt, High Street; Gloucester Co-operative Society.

CLITHEROE.—Electric light installation, Moor Lane United Methodist Church; secretary.

CRAYFORD (Kent).—Municipal buildings extensions, with electrical and heating work, for the U.D.C.; Frank Leary, engineer (returnable deposit of £3 3s.).

CROMPTON.—Central school for Lancs. E.C.; director of education, Preston.

DERBY.—Artificial silk factory, Deadman's Lane, for the British Netherlands Artificial Silk Co., Ltd., London.

DOVER.—Houses for 4,000 miners; Corporation and Tilmanstone Colliery.

DUNSTABLE.—Primitive Methodist Church; trustees.

EASTBOURNE.—High school, for the Borough E.C.; director of education.

EASTLEIGH.—Science block (£5,500); Hampshire Education Committee.

EDMONDSLEY (Co. Durham).—Institute, for the Miners' Welfare Fund Committee; B. Wears, builder, Grange Villa.

FEATHERSTONE (Walsall).—Church for the United Methodist trustees; Rev. John Naylor, Cheslyn Hay.

GILLINGHAM (Kent).—Maternity and child welfare centre, for the T.C.; T. Cornelius & Son, builders. Place of worship, for the Salvation Army; Lt.-Col. Arthur Rowe.

GLASGOW.—Child welfare centre for Corporation (£4,500); city architect. Elementary school, Knightswood; Education Committee.

GLASTONBURY.—Town hall and extensions to Council buildings, for the T.C.; A. J. Pictor, architect, 14, Queen's Square, Bath (returnable deposit of £2 2s.).

GUILDEN SUTTON (Chester).—Electric light installation, Parish Church; vicar.

GUILDFORD.—Operating block, Royal Surrey County Hospital, Farnham Road; governors. Factory and cottages, Woking Road; Cobbett & Sons. Shops, Onslow Village; Onslow Village, Ltd.

HADLEIGH.—Extensions to schools (£18,108), for Essex E.C.; county architect, Chelmsford.

HERNE BAY.—Showrooms and offices, 65, Mortimer Street, for the Herne Bay & District Electricity Co., Ltd.; R. Messenger, architect.

HOCKLEY.—Extensions, High Road School, for Essex E.C.; county architect, Chelmsford (returnable deposit of £1 1s.).

HORNCHURCH.—Branch institution, for Romford B.G.; Harrington & Evans, architects, Western Chambers, South Street, Romford (returnable deposit of £3 3s.).

INVERNESS.—Cinema (£20,000); J. Fairweather, architect, Glasgow, and Carruthers, Ballantyne & Taylor, architects, Inverness. Buildings to be used as laundry for Northern Infirmary (£9,500); medical superintendent.

IRISH FREE STATE (Maryborough, Queen's Co.).—Conversion of Shaen House to tuberculosis hospital for County Board of Health; D. Heaney, engineer and architect, Thurles, Co. Tipperary.

(Naas, Co. Kildare). —Electric wiring installation in Courthouse and offices, Kildare Committee of Agriculture, and National Health Insurance office, for the C.C.; McEntee and O'Kelly, consulting engineers, 23, Upper O'Connell Street, Dublin.

LEICESTER.—49 houses, Alma Street; S. A. Potter. Improvements, Corn Exchange; city engineer. Clinic, Cromwell Street (£3,656); Education Committee. Conversion old electricity buildings as public washhouses (£4,500); city engineer.

LINDSEY (Lincs.).—Extension of Mental Hospital (about £30,000); surveyor, Lindsey C.C

LONDON (Spitalfields, E.).—Market buildings, Brushfield Street, Duval Street, Commercial Street, and Crispin Street; City corporation.

(Ilford, E.) — School-church, Ashurst Drive (£5,000 to £6,000), for the Baptist trustees; Rev. Frank H. Smith, pastor of High Road Church.

(Hendon, N.W.).—Central school, Watling Estate; vicar of St. Alphage. Secondary school, Watling Estate; Middlesex Education Committee.

(Camberwell, S.E.).—Two blocks of tenements, Comber Estate, for L.C.C.; R. J. Rowley, Ltd., Tottenham.

(Catford, S.E.).—Houses (32), Bellingham, for the London C.C.; chief engineer, 3, Warwick House Street, Cockspur Street, Charing Cross, S.W. (returnable deposit of £1)

(Lambeth, S.E.).—Adaptation of tramway offices (£18,500); Holland and Hannen & Cubitts, Ltd.

(Lewisham, S.E.).—Elementary school, Grove Park (£17,000); F. R. Hipperson. Development, Tewkesbury Lodge Estate, for Dashwood & Partners, Ltd.; J. S. Brocklesby.

(Penge, S.E.).—Poys' county school; Elliman & Son, builders, Bromley Road.

(Wimbledon, S.W.).—11 shops, Durnsford Road; G. W. Beattie, Ltd. Showrooms, offices and flats, Coombe Lane; G. Smith.

LUTON.—Extensions, Children's Sick and Convalescent Home (£20,000); Mr. Parrott, architect.

MANCHESTER.—Aerodrome, Chat Moss Estate; Corporation and Air Ministry. Secondary school, Kirkmanshulme Lane; Education Committee. Elementary school, Mauldeth Road; Education Committee.

NEW HINKSEY (Oxford).—Extensions to church schools (£3,000 to £4,000), for the managers.

NORTHFLEET (Kent).—Paper mill extensions (£550,000), for Bowater's Paper Mills, Ltd.

OLDHAM.—Extensions, Marsland Mills, Green Street; Kirkman & Mannock, Ltd. 26 houses, Merton Avenue; W. Makin.

PORTSMOUTH.—50 houses, Southampton Road; Douglas Haig Memorial Committee. 27 houses, off Hayling Avenue; McCarthy Bros. 28 houses, Gatcombe Avenue; S. Brittan.

RAMSGATE.—Electric light installation, Royal Victoria Pavilion, for the T.C.; C. E. Hume, Stanley Lodge, Grange Road. Re-erection (after fire), of Hotel Sanclu, Victoria Parade, lighted by electricity, for Major Watkins.

REDRUTH.—Houses (58), for the U.D.C.; L. Winn.

ROMFORD.—Telephone exchange for H.M. Office of Works, King Charles Street, London, S.W. (returnable deposit of £1). Cinema, South Street and Western Road, for the New Victory Super-Cinema (Romford), Ltd., 2, Coleman Street, E.C.

SCARBOROUGH.—Houses (114), Northstead Estate, for the T.C.; R. Barron & Co., Ltd., builders, Coundon, Bishop Auckland.

SKEGNESS.—Council school (£4,000); Burbridge & Porter, builders.

SOLIHULL.—New church, near Birmingham Road; Rev. C. O. R. Wormald, rector.

TORQUAY.—Rebuilding Court Café, Babbacombe, for the T.C.; borough engineer (returnable deposit of £2 2s.).